

de Havilland DH 2

in action



Don Groer

 Aircraft Number 171
squadron/signal publications

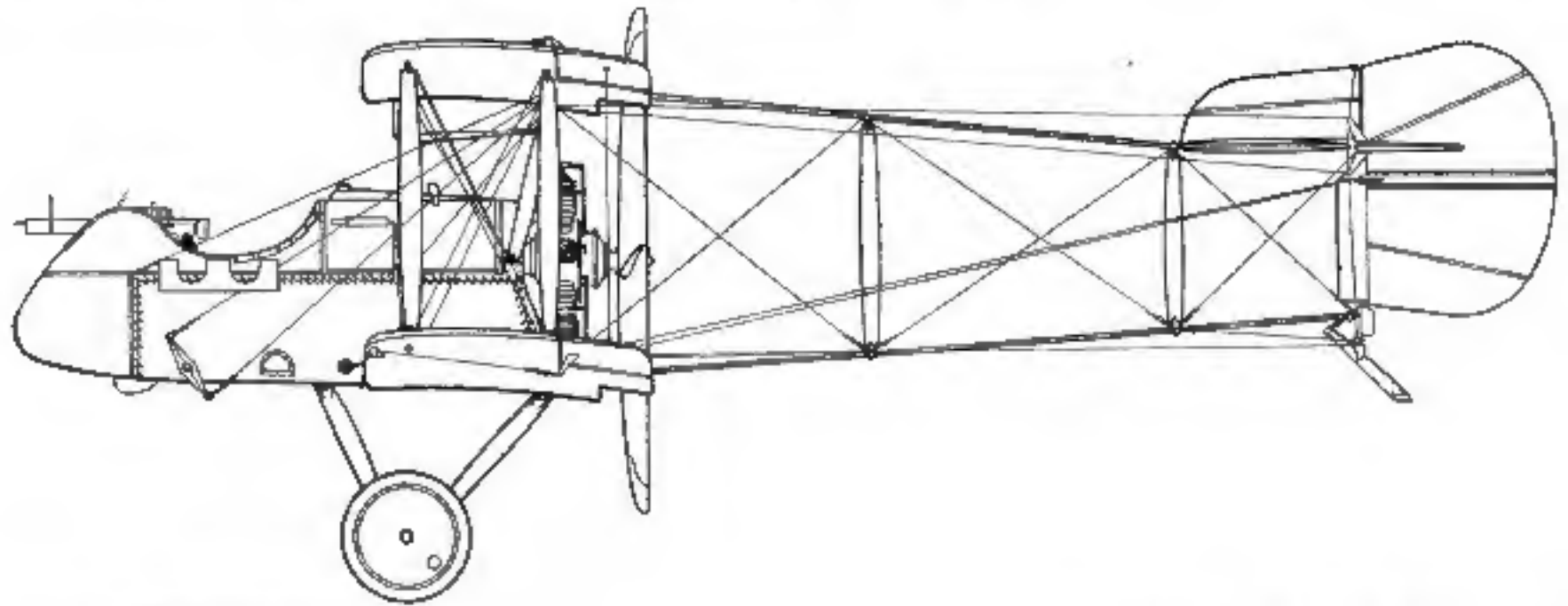
de Havilland DH.2

in action

By Peter Cooksley

Color by Don Greer

Illustrated by Richard Hudson and Glen Phillips



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(Cover) Major Lanoe G. Hawker meets his destiny in the cold, grey French skies on 23 November 1916. Major Hawker and his wingman engaged a flight of new German Albatros fighters led by Rittmeister Manfred von Richthofen high over the trenches. Maj Hawker's wingman was forced out of the fight after being hit in the engine, while Hawker was forced down to treetop level when a final burst by the Red Baron killed him. Major Hawker had nine victories to his credit at the time of his death. Hawker was the Red Baron's 11th victim.

Acknowledgements

The author is grateful for reference to the published researches of J.M. Bruce and B.J. Gray, as well as those of Cross & Cockade International, all of which have also contributed photographs in addition to Maurice Allwood, Philip J. Birtles, V.J. Garwood, Paul Leaman, Stuart Leslie (custodian of the JMB/GSL Collection) and Bruce Robertson. Photographs not from these sources came from the author's own collection.

Author's Note:

Although not specifically designed for the purpose of combating the 'Fokker Scourge' as some publications have erroneously stated in the past, the DH.2 was to make a significant contribution to doing so on the Western Front, thus securing a place in the history of air warfare as an early step in the evolution of the fighter aircraft.

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(Right) This late production DH.2 (5925) seen at Brooklands still carries the red wheels and red and white outer strut markings of No. 24 Squadron, RFC. This aircraft served with that unit between February of 1916 and 22 May 1917, when the DH.2 was flown back to England. The inner face of the starboard wheel may be doped white. The large fairing under the nacelle, which housed the compass, is reduced in size. The semi-circular wind-screen over the gun slot indicates that this aircraft has been relegated to trainer use.



Introduction

Military 'pushers' — aircraft with the engine and airscrew (propeller) behind the pilot — were a type routinely associated with World War One. The basic concept had existed well before the outbreak of World War One in August of 1914 (e.g. the Wright 'Flyer' of 1903). Although both tractor and pusher aircraft were developed during the early 1900s, military pusher aircraft development suddenly came to fore in the years preceding WW I. This development effort was due to the inability of firing a machine gun through a tractor airscrew without shooting the propeller blades off the aircraft.

Even during his earliest days as an aircraft designer Geoffrey de Havilland had looked favorably upon aircraft with a pusher configuration. Indeed, de Havilland's first attempt at aircraft design had been of this type — the **de Havilland 1** (not to be confused with the later and different Airco DH.1). The design of the de Havilland 1, the first aircraft to bear his name, had begun in 1908 in collaboration with his friend F.T. Hearle. Construction took place in a shed belonging to Hearle at Fulham, South West London, but the project was not completed until the early months of 1909.

One cause of the delay had been the lack of a suitable engine, which forced de Havilland and Hearle to design a 45 HP horizontally opposed, four-cylinder, water-cooled motor. The engine was built by the Iris Motor Company of Willesden, north west of London, which charged £250 (about \$500) for the work. The motor weighed 250 lbs (113.4 kg) and was equipped with a 27 lb (12.2 kg) flywheel. The flywheel was later discarded after it was discovered that the propeller did the same work. The engine was delivered in six months ready for installation into the airframe.

The de Havilland 1 was a three-bay, unstaggered biplane with a 36-foot (11 m) wingspan. The wingtips were equipped with inverse-tapered ailerons — quaintly known at the time as 'hinged wing-tips'. The fuselage consisted of a wire-braced, whitewood open girder structure measuring 29 feet (8.8 m) long. The motor was centered in the fuselage behind the pilot's seat. Transmission shafts and bevel-gears connected the engine to a pair of aluminum, adjustable-pitch pusher propellers. The arrangement was similar to that of the Wright 'Flyer' which had used chains to connect the single engine to a pair of pusher propellers.

The de Havilland 1 was taken to Crux Easton in the County of Hampshire for testing in April of 1909. It was not until the following December, however, that the first flight was attempted on a bright afternoon with a helpful breeze blowing up the hill. The first takeoff, with de Havilland at the controls, was successful and a flight of about 35 yards (32 m) was accomplished before the wings on the port side collapsed. The failure of the port wings was immediately followed by the wings on the starboard side when the main spars failed. The machine crashed, fortunately with little injury to Geoffrey de Havilland.

Undaunted, de Havilland gave orders that the motor be salvaged and fitted to his next design, the **de Havilland 2**. The de Havilland 2 was of a more conventional Henry Farman-like appearance and again a pusher. It was taken first to Litchfield, Hampshire and then to Newbury, Berkshire where it was readied for its first flight on 10 September 1910. The first flight of the de Havilland 2 was completely successful. When de Havilland was hired by the Royal Aircraft Factory in December of 1910, his de Havilland 2 was purchased by the authorities for £400 (just under \$800) and renamed the **F.E.1**. De Havilland continued to oversee improvements to the aircraft until it was crashed during the summer of 1911 by the Royal Aircraft Factory's Assistant Superintendent, Lieutenant Theodore J. Ridge.

The F.E.1 was rebuilt as the **F.E.2** and reappeared in September of 1911. The 'tea-tray' front elevator was removed, the wing airfoil section was changed, and the tail unit was completely

revised. Additionally, dual controls were fitted — these significantly being carried within a central fuselage nacelle. A new, 50-HP Gnome rotary motor driving a pusher airscrew was fitted at the rear of the nacelle. All of these new design elements were pointers to the later DH.1, 1A, and DH.2 aircraft that were to result from de Havilland's influence at the Airco factory in the next few years. In the meantime, the F.E.2 series continued to be perfected by others. Eventually, from the **F.E.2a** onwards, there was little or nothing in common with the earlier design except for the pusher configuration. One final modification — believed to be the result of de Havilland's final direction in the F.E.2 project — was the fitting of a free-mounted Maxim machine gun in the fuselage nacelle. The F.E.2 was accidentally destroyed on 23 February 1914 near Wittering in the County of Sussex. The pilot lost control at the end of a steep, spiral dive due to the design having insufficient fin area to balance the forward nacelle.

The Royal Aircraft Factory was certainly cognizant of the gun mounting problems. By the time war was declared at the beginning of August of 1914, the Factory was probably more experienced than any other aircraft manufacturer in fitting weapons to aircraft. During January of 1913 the Royal Flying Corps (RFC — the forerunner of the British Royal Air Force) conducted a series of weapons experiments. These experiments involved the mounting and firing of Rexer, Hotchkiss, and Vickers machine guns on a **Henry Farman F.20**. Other aircraft, such as the F.E.2, the type derived from Geoffrey de Havilland's earlier F.E.1, were also involved. De Havilland had envisioned his F.E.1 as having a small forward nacelle carrying a Maxim gun on a flexible mounting.

Except for the de Havilland 1 and the F.E.1, all of Geoffrey de Havilland's earlier efforts had been tractor designs — the **S.E.1**, **B.E.1**, **B.E.2**, and the **S.E.2**. The S.E.2 had undoubtedly been one of the most significant designs by the standards of the time. The S.E.2 had achieved a speed of 91.4 MPH (147.1 kmh) in April of 1913, consequently, the trim single-seater's place in history was secure. The S.E.2 was among the fastest flying machines then existing, as well as the fastest biplane produced by Britain up to that time.

Geoffrey de Havilland left the Royal Aircraft Factory in June of 1914. Shortly thereafter, de

The de Havilland 1 was Geoffrey de Havilland's first successful pusher. This aircraft featured twin propellers — driven by a single engine — and a four-wheel undercarriage. The machine suffered structural failure on its first flight.



Havilland found employment with the Aircraft Manufacturing Company (Airco) — a company founded by George Holt Thomas in 1912. The company was an agency for the issue of licenses to manufacture Henry and Maurice Farman aircraft. Geoffrey de Havilland suggested that Airco establish a design department shortly after joining Airco.

The preoccupation with pusher type designs during the early war years is not difficult to appreciate. Early in 1915, after six months of war in Europe, no proven arrangement of firing a gun in the direction of flight existed, although Raymond Saulnier, a French aircraft designer, had conducted experiments in Paris, France during the winter of 1913. These experiments involved a synchronization gear that was designed to allow a machine gun to fire through the arc of a revolving propeller without the risk of damage to the propeller. A mechanism, designed in collaboration with Louis Peyret, had been developed by April of 1914, but had been abandoned owing to problems created by hang-fire rounds. It was impossible to prevent these rounds, essentially fired after some delay, from striking the revolving propeller. Time and Anthony Fokker would eventually vindicate Saulnier's theory.

Pusher military aircraft, therefore, continued to be among the accepted design compromises during the early years of the First World War. This was the dynasty from which sprang the DH.1 two-seater and DH.2 scout.

DH.1

By the time Airco's first fighting aeroplane was completed, the British Empire was already at war with Kaiser Wilhelm II and Imperial Germany. Airco's first combat aircraft, the DH.1, was known by the initials of its designer (de Havilland) rather than that of his employers. The DH.1 was a single engine, two-seat pusher biplane which performed the dual roles of fighter and reconnaissance. The two roles indicated the early stages in which aircraft design stood in 1915. There was little specialization among the uses to which aircraft were put — hardly surprising in light of the fact that the Wright Brothers had made mankind's first successful con-

A factory fresh DH.2 (5943) carries the early style ammunition drum bin and a covered machine gun mounting post. The white lettering on the tire reads PALMER CORD AERO TYRE 700 x 75. An Aircraft Manufacturing Company (AMC) decal has been applied to each of the wing and tail boom struts.



trolled, heavier-than-air flight only 12 years earlier.

The DH.1's armament consisted of a single .303 caliber (7.7 mm) Lewis machine gun mounted on a tall pillar in the forward cockpit. Curiously, this arrangement was arrived at by de Havilland when his first ideas for a combat aircraft were for a tractor type. The front mounted engine and propeller required that the machine gun be placed on a pillar to allow the weapon to fire over the airscrew arc. The British War Office, which controlled British military aircraft requirements at the time, made it clear that future designs must be of the pusher configuration in order to provide the front seated gunner with an unobstructed field of fire. As a result, de Havilland abandoned his earlier ideas and began again — this time drawing on the experience gained during his three and half year employment at the Royal Aircraft Factory. This experience had culminated in his association with the Farman F.20 armament trials.

DH.2

The DH.2 was the Royal Flying Corps' first single-seat fighter, a machine that was neither fast nor initially popular due to its limited speed range and sensitive controls. Careful handling was demanded of its pilots if the spinning accidents that had claimed the lives of a number of flyers in training were to be avoided. Nevertheless, when the DH.2 first arrived on the Western Front in February of 1916 it was quickly pressed into service by No.24 Squadron. The DH.2s began flying regular patrols and, before and during the opening phases of the Battle of the Somme, went some way towards winning a measure of air supremacy from the Fokker E.III monoplanes of the Imperial German Air Service. The Fokker E.IIIs had created a grave set of circumstances for the Allied airmen. The E.IIIs were sweeping the skies of Allied reconnaissance aircraft and were doing severe damage to their escorts as well. The arrival of the DH.2 effectively ended what had become known as the 'Fokker Scourge' and Allied reconnaissance machines could now go about their work with little interference from German aircraft.

The appearance of the DH.2 was of immense advantage to the RFC at a critical time, how-

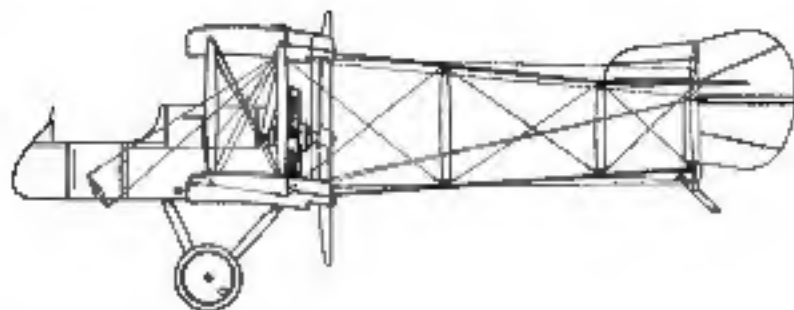
DH.2 (5943) is parked on the grass at Hendon during 1916. The visible internal wing and tail structure was made possible by the use of a clear-doped finish. The nose was painted in a dull medium grey finish. Hanging beneath the port wing is the 5.75-gallon (21.76 Liters) gravity feed fuel tank. The gun slot has been glazed over — a standard fitting when armament was not carried.



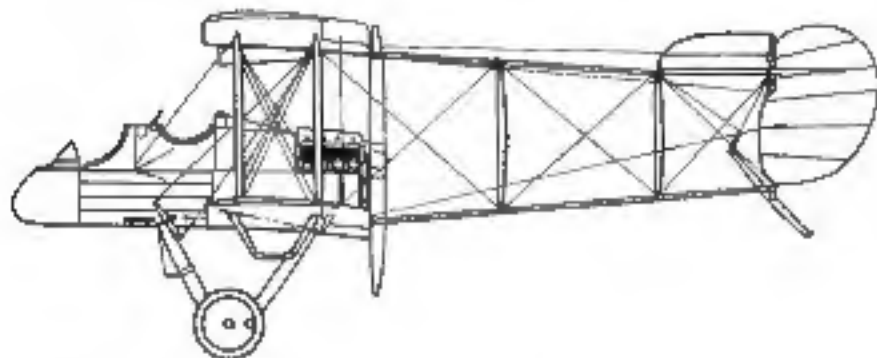
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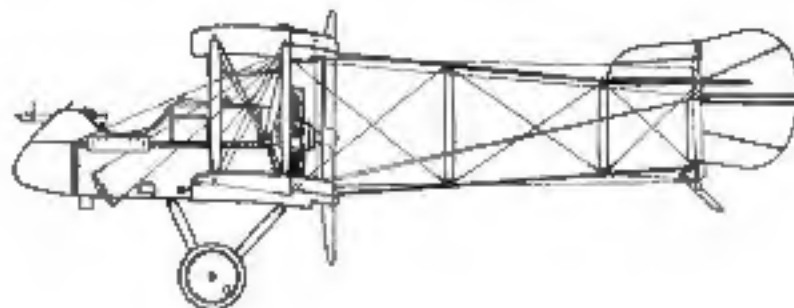
de Havilland 1



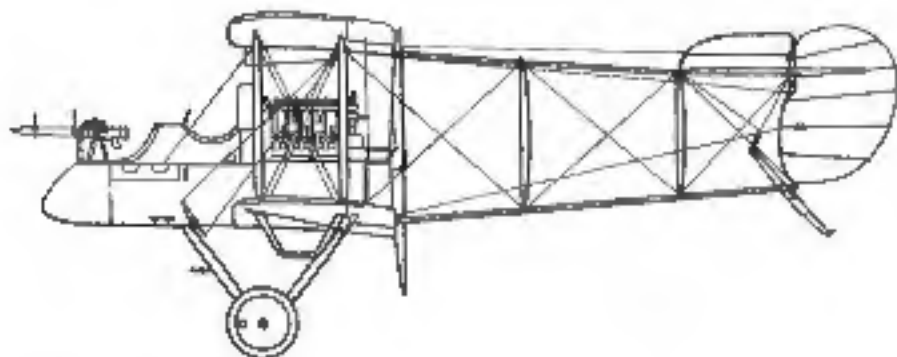
DH.2 Prototype



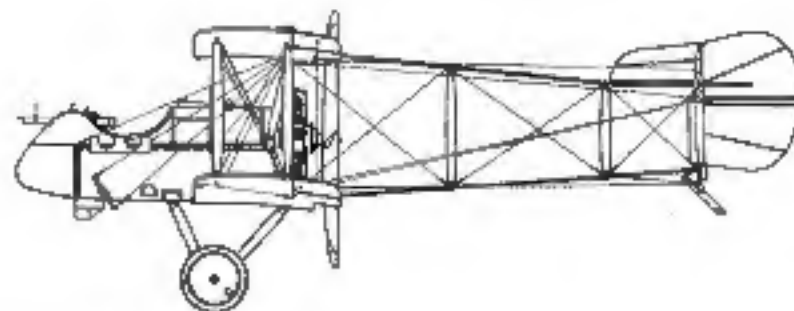
DH.1



DH.2 (Early Production)



DH.1A

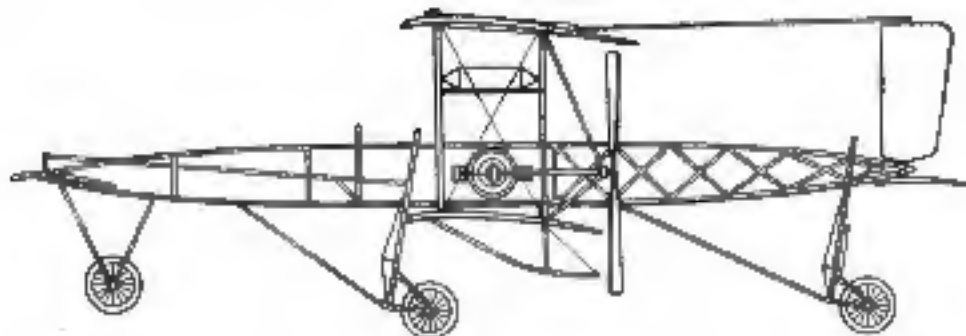


DH.2 (Late Production)

de Havilland 1

de Havilland 1 Specifications

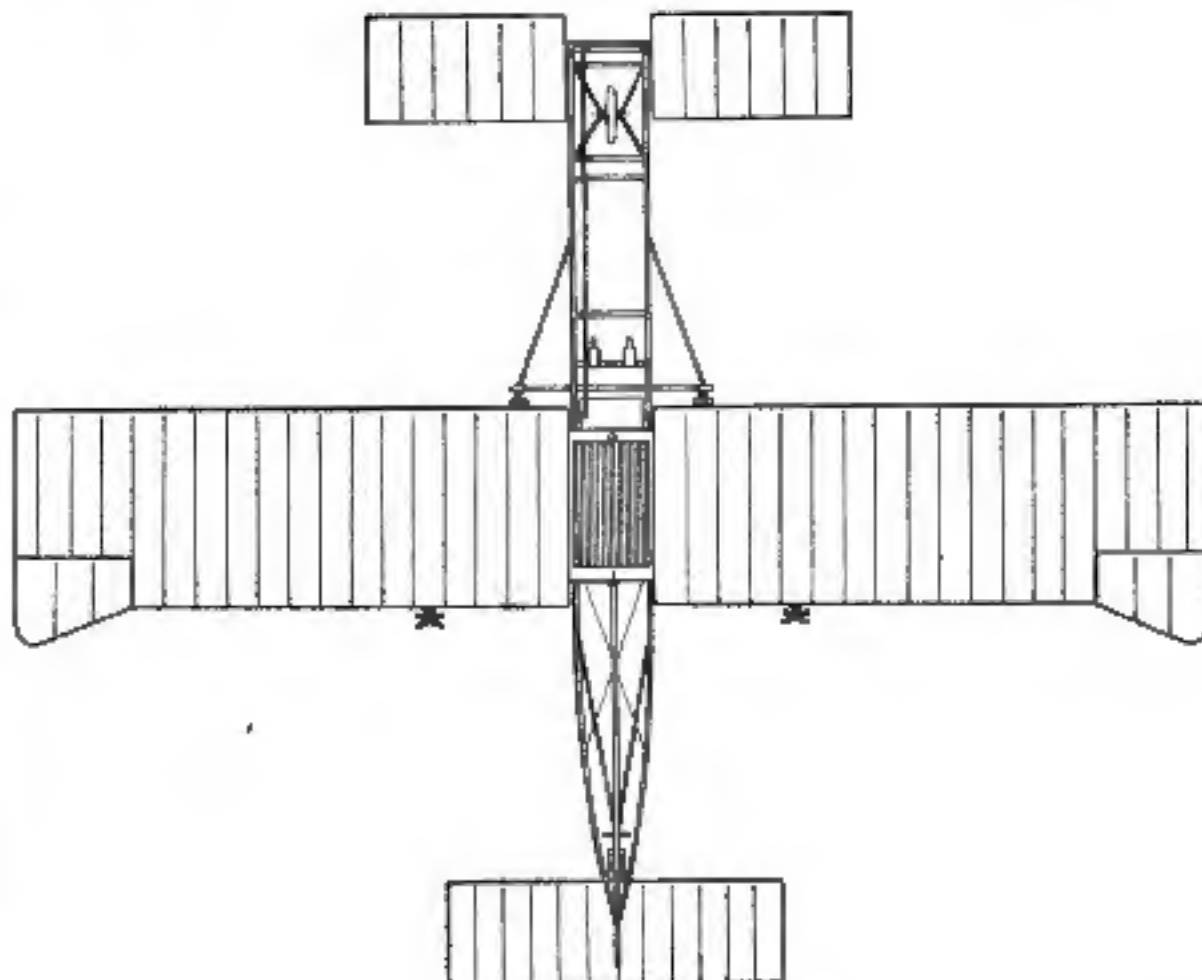
Wing Span.....36 Feet (10.97 Meters)
Length.....29 Feet (8.8 Meters)
Height.....10 Feet, 6 Inches (3.2 Meters)
Empty Weight.....850 Lbs (385.6 kg)
Powerplant.....One 45 HP liquid-cooled Iris engine
Crew.....1



ever, it was short-lived. By late September of 1916, German *Jagdstaffeln* (fighter squadrons) were being re-equipped with the newer and faster Albatros fighters. The pusher DH.2 proved to be incapable of adequately opposing the Albatros fighters. The DH.2 were forced to continue on, however, due to the lack of a suitable replacement that was available in any numbers.

Among the pilots using the DH.2 during this period was Sergeant (later Major) James B. McCudden who was later to be awarded the Victoria Cross (VC). In his memoirs McCudden was to write of the superiority of enemy aircraft encountered and how they "simply climbed above us, and there they remained until they wanted to go home...Oh! how I envied the other squadrons who were also at Le Hamel and had Nieuports with their wonderful climb." Later he commented on the DH.2 in which he accumulated a total of 177 flight hours: "I have never experienced such cold as that which we went through on those de Havillands at 12,000 and 13,000 feet during December 1916."

In fact, two other RFC officers who had received the VC were associated with the little pusher. Major L.W.B. Rees was awarded his VC for a combat on 1 July 1916 when he engaged a formation of ten German aircraft while flying DH.2 #6015 and Major Lance O. Hawker who died under the guns of Manfred von Richthofen while flying #5964 on 23 November 1916. The Airc DH.2 was not withdrawn from operational use in France until June of 1917 after a total of 453 aircraft had been built — one hundred of them going to training units.



Airco DH.1

Geoffrey de Havilland's first Airco-designed aircraft appeared in 1915 and was designated a 'reconnaissance fighter'. This was hardly a surprising description since mankind had only achieved controlled, powered flight a mere 12 years earlier. The uses of aircraft for military purposes were still somewhat vague in the minds of most of the warring powers' military staffs. Aerial reconnaissance and observation — already tested using balloons — seemed to be a logical use.

The new de Havilland DH.1 appeared at the Hendon factory early in 1915. The DH.1 was a two-seat, two-bay, pusher biplane powered by an air-cooled 70 hp Renault V-8 engine. The reason for the new Airco design being of pusher configuration was that the War Office had made clear that their requirement was for a machine giving maximum field of fire to a gunner. The tractor biplane, for which Geoffrey de Havilland had already begun drawings, was abandoned.

The prototype was subjected to tests personally conducted by Geoffrey de Havilland. These tests created something of a sensation, despite the aircraft being under-powered. The DH.1 proved to be a stable flyer capable of a maximum speed of 90 MPH (144.8 kmh) from sea level up to an altitude of 6000 feet (1828.8 m). The performance figures were undoubtedly received with some relief since a degree of re-design had been necessary — the DH.1 is believed to have been originally designed to employ a 100 hp Green engine.

The fuselage nacelle was constructed of wire-braced wooden frames covered with plywood and fabric, while the nose was fitted with a formed aluminium cap. An additional metal panel covered the upper section of the aft nacelle in front of the Renault V-8 engine. The observer's (front) cockpit was equipped with a single .303 caliber (7.7 mm) Lewis machine gun mounted on a telescoping pedestal. This mount enabled the weapon to cover most of the DH.1's forward hemisphere. Both cockpits were fitted with flight controls, however, only the pilot's (rear) cockpit was equipped with instrumentation — a clock, altimeter, airspeed indicator, compass, and engine tachometer. A metal fuel tank was located within the fuselage directly behind the pilot. The Renault engine, mounted behind the fuel tank, turned a nine-foot (2.74 m) diameter, two-bladed wooden propeller.

A pair of V-shaped wooden struts built into the lower fuselage nacelle structure supported the main wheels. The wheel track was five feet (1.5 m) wide. The rubber tires were 27.5-inch (69.8 cm) in diameter and were mounted on wire spoke wheels. The wheels were normally covered with fabric covers to prevent the build-up of mud and dirt. Brakes were not fitted — a feature common to most WW I aircraft.

The upper and lower wings were constructed of wood and covered with fabric. All four outer wing panels were equipped with ailerons and given a three-degree dihedral. The upper wing panels were joined to a flat (i.e. no dihedral) center section. This center section was supported by wooden cabane struts built into the fuselage nacelle structure. A pair of streamlined wooden struts supported the outer portion of the wing center sections, while a second pair of struts supported the outer wing panels.

Four wooden tail booms, built into the rearmost of the inner pair of wing struts, angled back to the rudder kingpost. The upper and lower booms were vertically braced by two streamlined wooden struts. The booms were joined at the rear by a single steel post, which also served as a pivot point for the rudder.

The horizontal stabilizer ran across the upper tail booms. Both the stabilizer and elevators

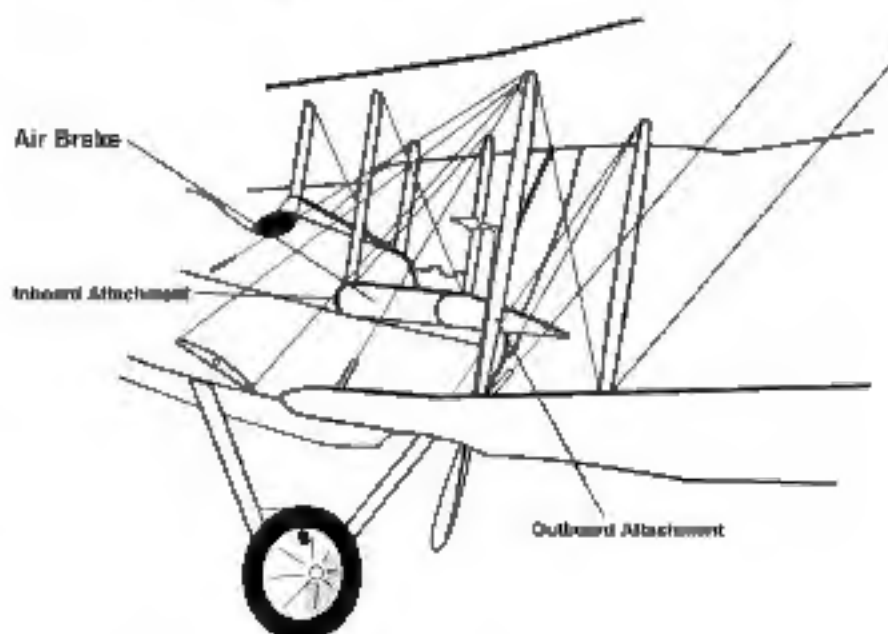
were made of wood and covered with fabric. A small fixed vertical fin was mounted on top of the horizontal stabilizer. The large, rounded rudder was mounted to the rudderpost where it pivoted between the left and right elevators. The vertical fin and rudder were also made of wood and covered with fabric. A sprung tailskid was secured to the rear of the tail boom. The skid pivoted on a support bracket mounted beneath the rudderpost, while the upper portion of the skid was spring loaded to the upper tail booms and rudderpost.

The entire structure of the DH.1, both internally and externally, was braced with wires tightened by turnbuckles. Although the prototype DH.1 was a typical pusher of the day, it had some novel features in that it was fitted with 'air brakes' and landing gear shock absorbers. The air brakes consisted of narrow chord airfoils located on both sides of the nacelle at the upper longeron level. These airfoils extended to the lead strut of the inner bay. Each of these surfaces hinged to pivot through 90° to the airstream. It was believed that in a vertical position the airfoils would slow the aircraft in flight. The air brakes were deleted before the completion of the prototype's test program.

Oleo shock absorbers were fitted to the apex of each undercarriage 'vee' with the wheels placed at either end of a split axle in the manner favored by Sopwith designs. These shock absorbers, perhaps due to their weight and complexity, were deleted on production models.

By the completion of the DH.1 trials program, 49 machines had been ordered and the prototype had been allocated the serial number 4220. The award of this production contract, although small, presented Airco with a problem. Airco was already committed to the manufacture of Henry and Maurice Farman's; consequently the first DH.1s were sub-contracted to Savages Limited. The firm, based in King's Lynn in the County of Norfolk, had been exclusively engaged in the construction of showmen's fairground equipment. Savages' complete lack of experience in aircraft manufacture resulted in the first DH.1 (4600) not being delivered

DH.1 Air Brake





The prototype DH.1 had its 'air brakes' removed shortly after flight trials began, although the unique shock absorbing suspension units (just visible inside the wheels) were retained. The overall finish is clear-dope with the metal parts of the nacelle in dull grey.

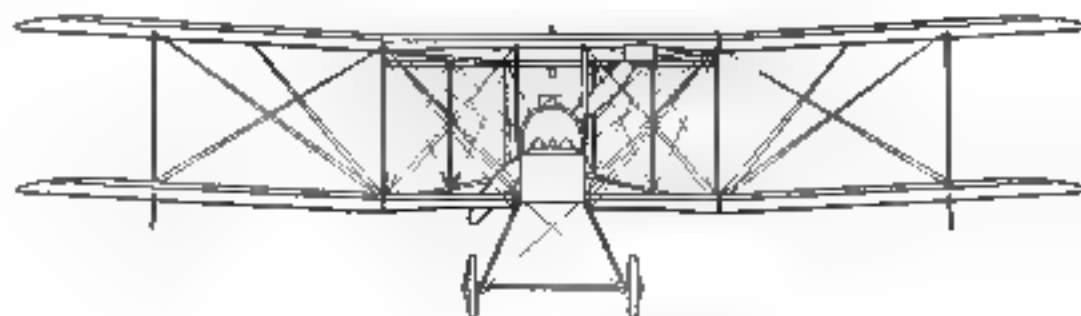
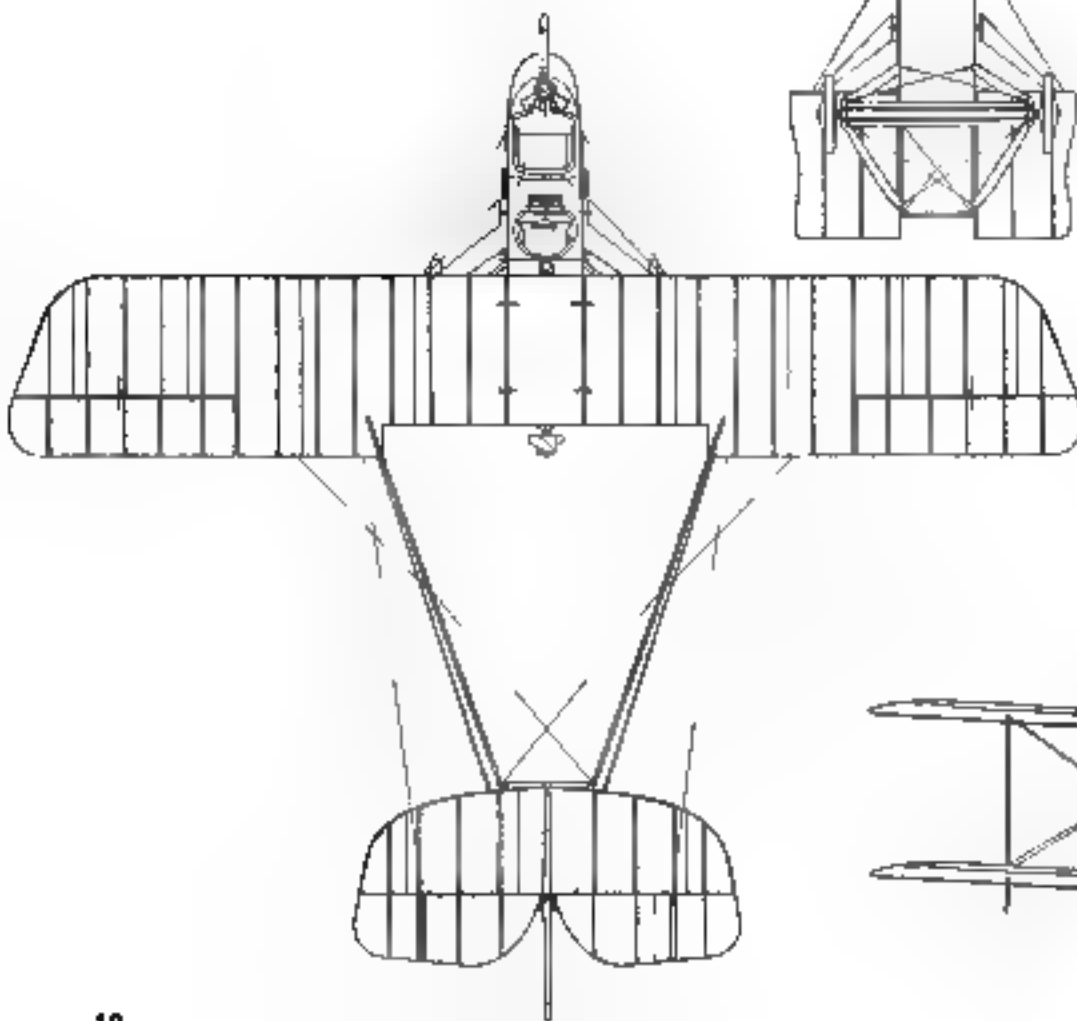
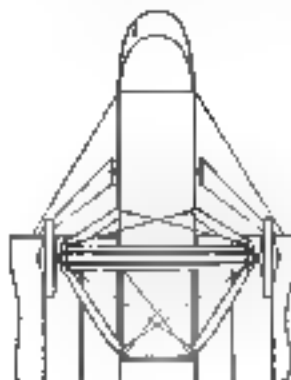
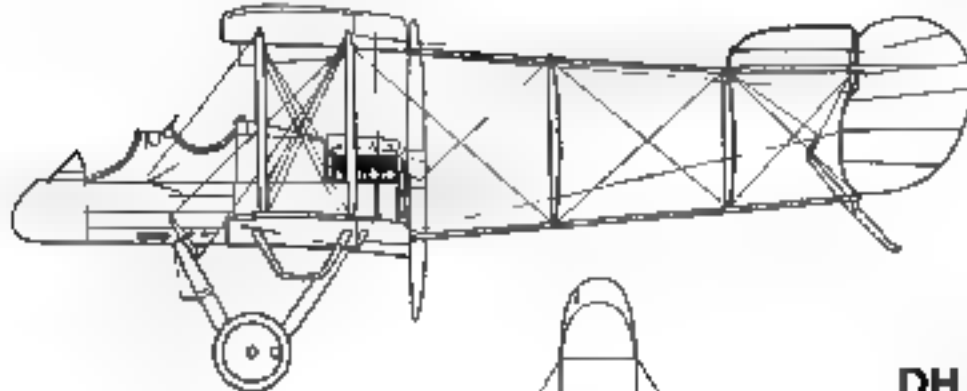
until the first week of November of 1915 after a fairly lengthy wait.

Production DH.1s differed slightly from the prototype. The front nacelle was redesigned to further increase the gunner's field of fire with his single Lewis gun on its No.4 Mk.1 telescoping pillar mounting. Additionally, the DH.1s were fitted with a rudimentary form of dual control. The exhaust system on the air-cooled Renault engine was also modified to duct the exhaust gasses from outlets at the *front* of the horizontal pipe — a possible attempt at avoid-

The de Havilland logo, consisting of a letter 'H' with the letters 'de' forming the middle bar, appears on the rudder.

ing needless, concentrated heat damage to the wooden propeller. The prototype's unique, shock absorbing landing gear was deleted in favor of a simpler springing by means of a rubber bungee cord wrapped around the one-piece axle.

It is believed that five new DH.1s, costing £1,100 (about \$2,000) each, were issued to training squadrons by the end of 1915. This figure was for the airframe and did not include engines, instruments, or armament.



DH.1 Specifications

Wingspan.....41 Feet (12.49 M)
 Length.....28 Feet, 11.25 inches (8.8 M)
 Height.....11 Feet, 2 Inches (3.35 M)
 Empty Weight.....1356 Lbs (615 KG)
 Maximum Weight...2044 Lbs (927 KG)
 Powerplant.....One 70 HP air-cooled
 Renault V-8
 Armament.....One .303 Lewis machine
 gun on a flexible forward
 mount
 Speed.....80 MPH (128.7 KMH) at
 3500 Feet (1066.8 M)
 Crew.....2



(Above) The two-seat DH.1 strongly resembled the later single-seat DH.2. This machine has a clear-dope finish, wing roundels, and rudder stripes. There are no national markings carried on the nacelle. Production DH.1s had the nose cut down to improve the observer/gunner's field of fire. The observer's windscreen is formed from two triangular panels.

(Below) A1638 of No. 59 Reserve Squadron is flanked by a row of canvas Bessoneau hangars at the unit's Yatesbury base. This aircraft was one of a batch of 50 DH.1s subcontracted by AMC (Airco) to Savages Limited of King's Lynn, Norfolk. The observer's cockpit lacks both weapon and windscreen.



Airco DH.1A

Modern research indicates that the DH.1 was originally intended to be powered by the 100-hp Green engine. The Green Company, however, was incapable of dealing with the sudden surge of engine orders that resulted from the outbreak of World War One. The shortage of Green engines forced Airco to select a lesser-powered 70-hp Renault air-cooled engine as an alternative. Certainly there existed the 120-hp liquid-cooled Beardmore engines, but these engines—long-believed by historians to be the motor originally intended for the DH.1—were already earmarked for the Royal Aircraft Factory F.E.2b and R.E.5 designs.

Whatever the truth, when the water-cooled, 20-hp Austrian-designed Beardmore engines did become available, they were fitted into DH.1 airframes. DH.1s equipped with the Beardmore engines were designated DH.1A. The value of the motor was summed up by a well-informed contemporary journalist who wrote: *"This engine is a greatly improved version of the Austro-Daimler, which itself was, in its time, one of the most efficient engines in being."*

The DH.1A was now capable of being directly compared to the F.E.2b due to the commonality of the motor. The DH.1A proved to be significantly superior: tests at the Central Flying School in May of 1916 showed that ten per cent more fuel could be carried by the DH.1A despite it being 300 lbs (136.1 kg) heavier. The DH.1A could also climb to 4000 feet (1219.2 m) in two minutes less than the earlier and less powerful DH.1. Additionally, the DH.1A was eight miles per hour (2.9 km/h) faster in level flight. Maneuverability and control response was also improved. Unfortunately, these test results emerged too late to officially reverse the decision to acquire large numbers of the F.E.2. Consequently, commitment to large-scale production of F.E.2 derivatives continued.

In addition to a superior engine, the DH.1A also differed from its predecessor in a number of small design details. The tail-skin, formerly 30 inches (76.2 cm) long and 2.75 inches (7 cm) wide was replaced by a skid that was 47 inches (119.4 cm) long, slightly less in width, and equipped with a longer metal shoe. Similarly, DH.1s and early 1As shared the same rudder type (part number AMC3027), however, later versions of the DH.1A introduced a new rudder (part number AMC3175) which was quite different in outline. With the introduction of the new rudder came a revision to the vertical fin which featured a slightly revised profile.

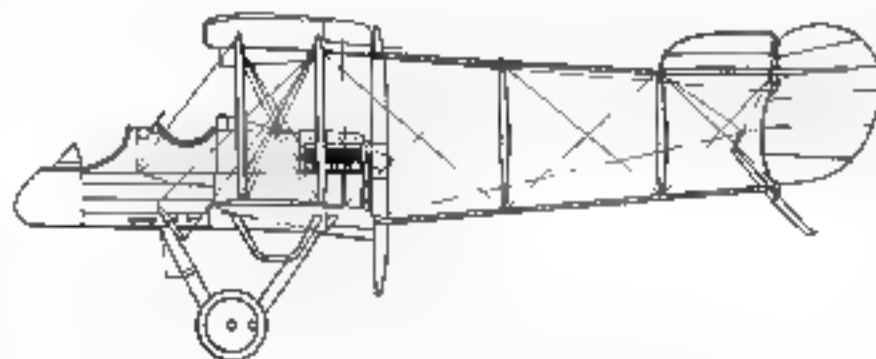
Early production DH.1A aircraft also used the same nacelle shape as those found on the earlier DH.1. A new nacelle—designed to improve the gunner's field of fire—was quickly introduced. Below the nacelle, the wheel track—formerly measuring five feet (1.5 m) in width—was increased by eleven inches (27.9 cm). The introduction of the liquid-cooled Beardmore engine resulted in the addition of a radiator behind the pilot. The addition of the radiator and the longer engine required the relocation of the main fuel tank from the fuselage nacelles to a position on the upper wing center section. The fairing over the Beardmore engine was not always carried in order to improve cooling. This was especially the case with the six DH.1As sent to the Middle East during 1916.

This small number of DH.1As was originally issued to No. 14 Squadron—a unit that had only been created at Shoreham, England and equipped with Maurice Farman on 3 February 1915. No. 14 Squadron soon settled down to instructional work until November of 1915 when it was posted abroad. The first DH.1As arrived in Egypt during mid-1916, however, they saw only limited service with No. 14 Squadron in Palestine as escort fighters. On 2 August 1916 a DH.1A brought down an Aviatik two-seater in the vicinity of Salmana. Eight months later the obsolete DH.1As were apparently still in service and it was recorded that one of the Airco

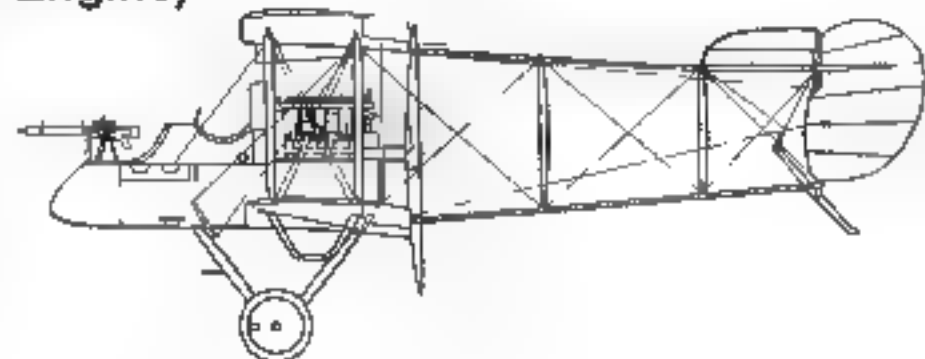
machines was forced down in March of 1917 and its two-man crew taken prisoner of war.

Back in England the remainder of the 73 DH.1 and 1A machines that had been issued to the Royal Flying Corps went to training units with perhaps a small number also seeing service with the Home Defence squadrons. Some of these antiquated (by comparison to more modern types) machines were still in service as late as 1918, however, all of the Airco two-seaters were gone some time before the Armistice took effect on 11 November 1918. Although it may be assumed that the type was little more than what seemed a good aircraft wasted, its true value lay in the fact that its potential was realized early enough for translation into the smaller form of the rotary-powered, single-seat DH.2 scout. The prototype DH.2 was flying by July of 1915—only six months after the two-seater. The DH.2 was to be the subject of Airco's first substantial order with some 400 machines going to the Royal Flying Corps.

DH.1 (Air-Cooled Renault Engine)

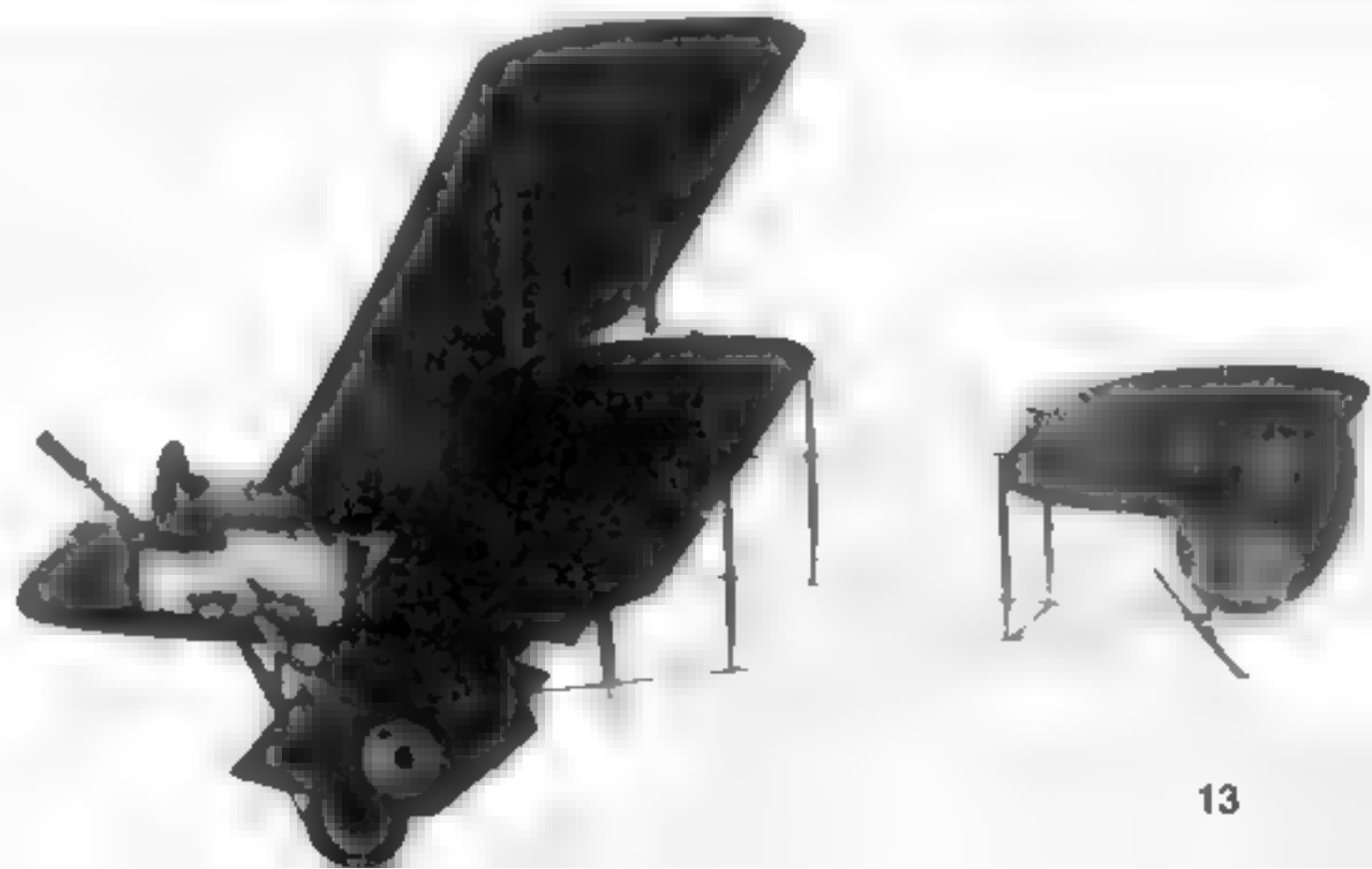


DH.1A (Water-Cooled Beardmore Engine)

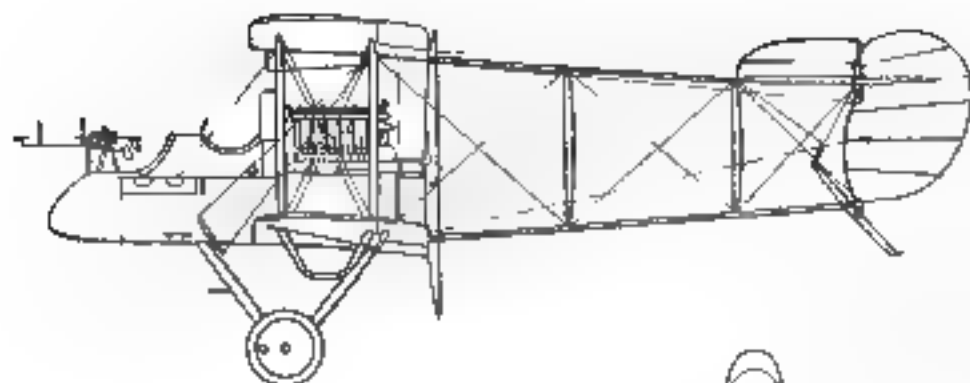




(Above) The split windscreen allowed an improved field of fire for the observer. The longer, 120 hp six-cylinder Beardmore engine (and its associated radiator) used in the DH 1A resulted in the fuel tank being relocated to a position hanging below the upper wing. The barely discernible part number on the fin adjacent to the rudder post is applied in two lines, while the numbers on the central rudder stripe appear in the more common single line style.

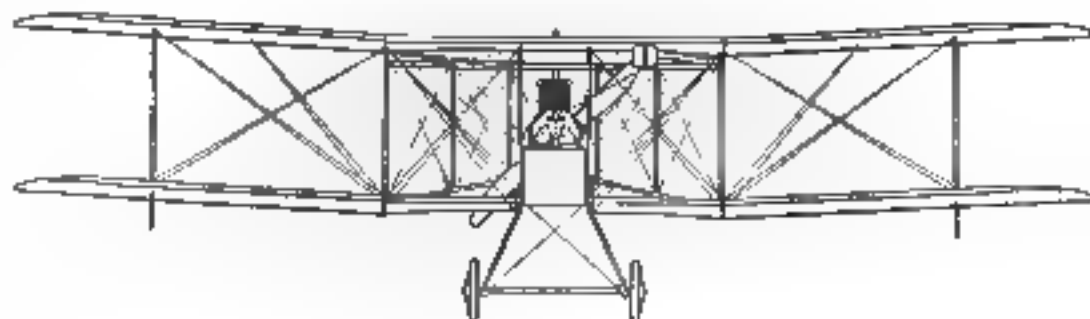
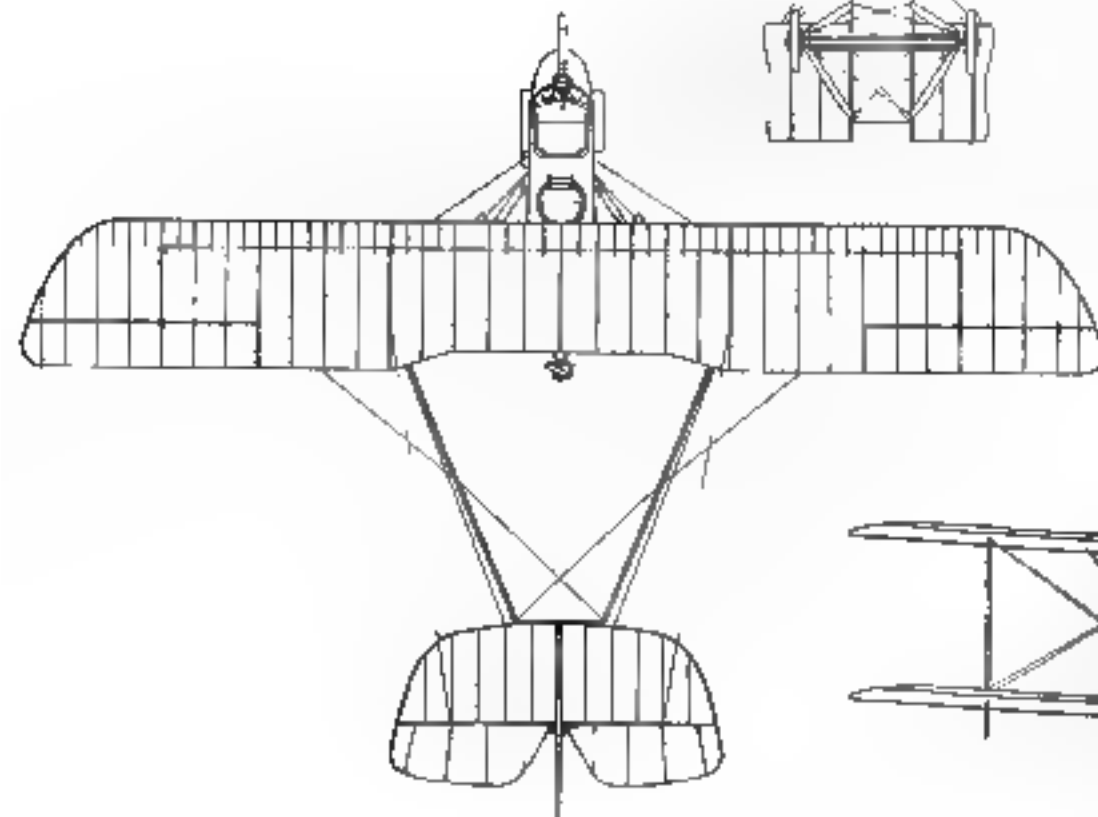
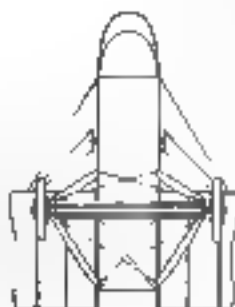


(Right) DH.1A (4606) has a Lewis gun installed on its pillar mounting. Both the gun and observer were exposed to the cold slipstream as well as to enemy fire. A dual ammunition rack is mounted on the side of the nacelle — a configuration repeated on the later DH 2



DH.1A Specifications

Wingspan.....41 Feet (12.49 M)
 Length.....28 Feet, 11.25 Inches (8.8 M)
 Height.....11 Feet, 2 Inches (3.35 M)
 Empty Weight1610 LBS (730 kg)
 Maximum Weight.....2340 LBS (1061.4 kg)
 Powerplant.....One 120 HP Liquid-cooled Austro-Daimler (Beardmore) V-8
 Armament.....One .303 Lewis gun on a flexible forward mount
 Speed90 MPH (144.8 kmh) at Sea Level
 Service Ceiling.....13,500 Feet, (4114.8 M)
 Crew.....2





(Above) This DH.1A is believed to have been operated by No. 14 Squadron in Palestine during January of 1918. Six machines were sent to the Middle East for operations against the Turks. The lack of advanced German fighters in the Middle East allowed the DH.1A to remain in combat service long after it was obsolete on the Western Front.



(R ght) This DH.1A is believed to be another No. 14 Squadron aircraft stationed in Palestine. The fighter-reconnaissance unit's base was nicknamed 'Junction Station' by the British. The semi-circular skids under the wings protected the wingtips from damage during rough landings.

Airco DH.2 Prototype

The design of the prototype DH 2 began in early March of 1915. The design, sharing the configuration of the earlier DH 1, evolved into a single-seat pusher scout with a 28 foot, 3-inch (8.6 m) wingspan — both upper and lower wings were equal in span, unstaggered, and had interchangeable upper and lower panels. The upper and lower wing panels were joined by a pair of vertical wooden struts. The upper wings were also joined by a center panel which, in turn, was joined to the aft fuselage nacelle via two pairs of cabane struts. The wings were constructed of wood and fabric covered. Both the rudder and horizontal tail plane had a steel tube framework and wooden ribs covered with fabric. The tail surfaces were joined to the main wings via upper and lower steel tubes (booms). The upper set of booms ended at the leading edge of the horizontal tail plane, however the lower set of booms came together at the lower end of the rudder post. The airframe was wire braced both inside and out.

The pilot was seated in the extreme forward end of the fuselage nacelle and given standard flight controls — a stick to control pitch (elevators) and roll (ailerons) and a foot bar to control yaw (rudder). The cockpit was equipped with minimal instrumentation — mainly having an altimeter, an airspeed indicator, and a clock. Provision for a .303 caliber (7.7 mm) Lewis machine gun was made at the front of the nacelle. The weapon was flexibly mounted on a telescoping pillar to permit the pilot to fire the machine gun at various points around the nose of the aircraft.

Fuel and oil tanks were mounted within the nacelle behind the pilot. The fuel tank held approximately 20.2 U.S. gallons (76.5 l) and was supplemented by a 5.75 gallon (21.8 l) gravity feed tank mounted beneath the upper wing center section. The oil tank held some 4.5 gallons (17 L). Power was provided by a 100-hp, 9-cylinder Gnome Monosoupape rotary engine which turned a two-bladed, 8 foot 2.5 inch (2.5 m) diameter wooden propeller.

The new de Havilland single-seat pusher made its first flight at Hendon on 1 June 1915 and surprisingly proved to be a disappointment — chiefly from the fact that it was tail heavy. In an attempt to rectify this, the first modifications were carried out: the tail was not only lightened, but the inadequate surface area of the fin and rudder was increased and a quantity of lead installed in the nose. Additionally, the rudder structure was revised. In a further attempt to bring the center of gravity forward, the fuselage nacelle was shifted four inches (10.2 cm) forward.

The smooth contours of the immediate nose, which resembled those of the prototype DH 1, also came in for attention. The port side was cut away to provide room for the .303 caliber Lewis machine gun. Two 47-round ammunition drums were stored in a sheet-metal bins on both the port and starboard sides of the cockpit.

The DH 2's flight characteristics proved more satisfactory with the modifications to the tail. So much so perhaps, that the astonishing decision was made to expose the prototype DH 2 to the hazards of operational conditions over the Western Front. The sole DH 2 was marked with a small Union Flag on the lower part of the rudder, British roundels under both lower wing tips, and a single roundel centered on the upper surface center section of the top wing and sent off to war. The DH 2 arrived in France on 26 July 1915 and was attached to No. 5 Squadron at St. Omer, where it acquired red, white, and blue vertical stripes on the rudder. The service serial number 4732 was superimposed in black over the rudder stripes.

Operational experience in France seemed to indicate a possible engine cooling problem. During its brief service period, the aft section of the upper engine cowl was modified — pre-

sumably in the field — to increase the downward slope aft between the center-section struts. This modification is believed to have been an attempt to channel additional air to the engine cylinders.

The DH 2 prototype had been in France for a mere two weeks when disaster struck. The valuable machine, piloted by Captain Robert Maxwell-Pike, the commander of No. 5 Squadron's 'B' Flight, was flying in the vicinity of Ypres, Belgium when it was fired on by German anti-aircraft batteries. The anti-aircraft fire had no effect on the pilot or the machine, however shortly thereafter Captain Maxwell-Pike was engaged by an intercepting two-seat Albatros and mortally wounded in the head. With his life ebbing away, Maxwell-Pike was still able to make a passable landing just over three miles (4.8 km) east of Ypres. The DH 2 turned over on the rough ground and, in the custom of these early days of air fighting, a German airman dropped a notification of Captain Maxwell-Pike's death over St. Omer.

Since the anti-aircraft fire encountered just before its interception by the Albatros had inflicted no damage, and it was the death of its pilot that had brought it down, the Germans were presented with an intact and largely undamaged example of Britain's new single-seat scout. The machine was perfectly capable of being reconstructed and this was accomplished — even to the extent of building a new rudder, although the rudder was oversized and of an incorrect contour. Despite the rebuilding efforts, the Germans made no real attempt to fly the captured DH 2 and, for a time, believed that the little single-seat de Havilland was a new Vickers single-seater. The Germans, perhaps, assumed it to be a variant of the Vickers F.B.5.

The prototype DH.2 wears a waterproof cover over its cockpit during an engine test run at Hendon. No markings have yet been applied to the aircraft. The metal panel running forward of the motor is straight, while the cockpit is smaller and the line of the nose is sharper. The rudder also lacks the small stabilizer area forward of the king-post found on production machines. Ground crewman hold the machine in place, while the 'up' elevator helps to hold the tail down while the engine is run up.





The prototype's fabric surfaces were clear doped, while the metal areas of the nacelle were painted medium grey. RFC roundels were added to the lower wing surfaces and a Union Flag appears on the rudder. Aircraft Manufacturing Company (AMC) logos appear at the mid-point of all of the aluminum doped struts. The elevator control cables were

attached to the rocker arms on the side of the fuselage nacelle. The cables were routed to pulleys mounted at the top of the rear, inboard wing struts. From that point, the cables ran back to the elevators. Such a convoluted arrangement was necessary due to the requirement to route both elevator and rudder cables around the propeller arc.



Disassembled pieces of the DH.2 prototype are moved after the Germans brought down the aircraft on 9 August 1915. The pilot, Captain R. Maxwell-Pike, was killed in the crash. Red, white, and blue stripes with the number 4732 replaced the Union Flag on the rudder when the DH.2 went to France. Additionally, a roundel was placed in the middle of the upper center-section.

The cantilever gun mounting on the captured DH.2 prototype (4732) was offset to port. The weapon is a .303 caliber air-cooled Lewis machine gun with a 47-round drum magazine. The tires were salvaged for probable use on German machines. No attempt was ever made by the Germans to fly this DH.2.



The prototype nacelle, reassembled by the Germans for examination, displays the revised sloping line forward of the engine. This slope is believed to have been a British field modification to improve engine cooling. The seamen are members of Nr. 11 *Marine Feld Flieger Abteilung* at Moorslede, Belgium.

The reassembled prototype received a new, more rounded rudder to replace the original rudder, which had been destroyed in the crash. The Germans applied the rudder stripes and serial number to the new rudder in the same manner as they appeared on the original.



Airco DH.2

Despite the DH.2 being a rotary-powered single seater, when it first appeared it was clear that the new DH.2 scout owed much to the earlier DH.1 and 1A. The DH.2 was in many ways a scaled down version of the two earlier machines.

Aesthetically there was little to choose between the DH.2 and the other single-seat pusher scout that was its contemporary in 1916 — the similar, but slightly faster Royal Aircraft Factory F.E.8. The Airco DH.2 did present a sturdier appearance when it made its first flight only six months after the DH.1 had appeared. This was largely due to the extremities of the tail booms on the DH.2 converging to meet the tail plane main spar in profile.

The de Havilland scout, however, was not without its faults. After an inauspicious start to its career on the continent, the prototype was lost during its first days in France. The design also became legendary for the tendency of the Monosoupape rotary to shed its cylinders. This led to the danger of thrown engine parts severing the tail booms — often with fatal results.

The reputation for unreliability gained by these motors was not entirely merited since many of those installed in early machines had re-bored cylinders in an effort to increase their power. The re-bored cylinders had thinner walls along the length of the bore, but this was especially acute at the base which was in an area already perforated by the fuel and air inlet ports. This danger would probably not have been present on new engines. RFC authorities were already alert to the engine's shortcomings and ordered the running time of the engines on No. 24 Squadron's DH.2s be carefully conserved before subjecting them to the rigors of crossing the 22 miles (35.4 km) of the English Channel.

No. 24 Squadron was the first RFC unit to operate the DH.2, as well as the RFC's first single-seat fighting scout unit. The squadron's commanding officer was the popular Major Lance G. Hawker — already the holder of the Distinguished Service Order (DSO) and soon to receive the Victoria Cross, Britain's highest award for gallantry in action. Major Hawker flew the DH.2 with distinction until time and technology caught up with him on 23 November 1916. Major Hawker and his wingman engaged a flight of new Albatros D.II fighters flown by Jasta 2. Hawker engaged one Albatros unsuccessfully before he was put on the defensive by another Albatros flown by Baron Manfred von Richthofen. The battle eventually wound down to tree-top level since Major Hawker traded altitude for airspeed in an attempt to evade Richthofen. Richthofen followed Hawker and the slower DH.2 downward and fired one last burst, hitting Hawker in the head. Hawker was the Red Baron's 11th victory of the war. At the time of his death, Hawker flew DH.2 5964.

The DH.2s were at first unpopular due to their limited speed range and their tendency to spin under the gyroscopic effect of their motors once they had been switched off. This spinning tendency was worsened by the pilots' natural reaction of pulling the aircraft nose up under such circumstances. With skillful handling, however, the DH.2 gradually became accepted as a robust fighting aircraft. The only structural weakness that showed up — splits in the lower longerons during June of 1916 — were cured in No. 24 Squadron by fitting specially designed steel shackles.

Another problem, one common to most pusher types, was that the propeller tips were being damaged by debris pulled off the ground by the propeller. Splits in the two-bladed propeller tips were reinforced by doped cotton bindings, while four-bladed propellers were usually protected by brass sheathing. Doped cotton bindings was not unknown on four-bladed propellers. Four-bladed propellers were introduced as a result of tests using the four-bladed propeller from



Lieutenant J.O. Andrews of No. 24 Squadron, St. Omer, France, stands in front of an early production DH.2 in February of 1916. The gun's shoulder stock has been removed to save space and no windscreen is fitted. Slots have been introduced in the formerly plain ammunition bin, while an early type compass fairing is installed under the nacelle.

an FE 2. The new propeller was found to provide slightly improved performance. New production DH 2s were equipped with four-bladed propellers on the production line, while many existing airframes were retrofitted in the field. Later production DH 2 scouts were distinguished by these additions and by the fitting of twin-tube pitot heads on the port, inner forward wing strut.

The ammunition drum storage bins for the .303 caliber (7.7 mm) Lewis machine gun also went through a series of changes over the course of the DH 2's production run. These changes were primarily designed to decrease drum handling times while reloading in combat. Other changes involved storing ammunition drums inside the nacelle. A final change resulted in a bin capable of handling a single, 97 round .303 caliber drum magazine fitted on each side of the cockpit.

The gun mount also went through some changes. The early telescoping pillar flexible mounting was not well liked by the pilots despite its official sanction. The system proved to be needlessly difficult: pilots were often trying to fly in one direction while aiming in a second direction at a target flying in a third direction. The obvious solution was to fix the weapon in place and aim the aircraft at the target. Various methods of fixing the Lewis gun in place were developed—usually in the field. Permanent fixing methods were often officially prohibited, forcing the pilots to use 'field expedient' methods of temporarily clipping the machine gun in place, but still leave the option of unclipping the gun and using it in a flexible mode.

Early production DH 2s were fitted with 5.75 gallon (21.8 L) gravity fuel tanks under the upper wing center section. The unarmored gravity tanks were later moved above or below the outer wing on that side. Additionally, later production machines were given a new main fuel

tank with the capacity increased to 26 gallons (98.4 L). The compass fairing projecting beneath the nose of the nacelle also varied in shape and size during the DH 2 production run.

Production DH 2s initially left the assembly lines with the fabric surfaces finished with clear cellulose dope, the metal panels of the nacelle painted medium grey, and the wooden struts and metal booms painted grey. Many machines appear to have had their struts coated with a tinted varnish in lieu of the grey paint. Later machines had the upper surfaces of the wings and tailplane finished with PC10 khaki green (approximately FS 14087) dope. The strength of the color depended often upon the thickness of the application and the effects of the local climate. These machines usually retained their clear doped undersurfaces and many also retained the clear doped fabric panels on the nacelle sides. Still other DH 2s had PC 10 nacelle panels and vertical fins. Whether by accident or design, DH 2s assigned to Middle East operations seem to have retained their clear dope finishes since the pale tan color was more suitable to the desert terrain.

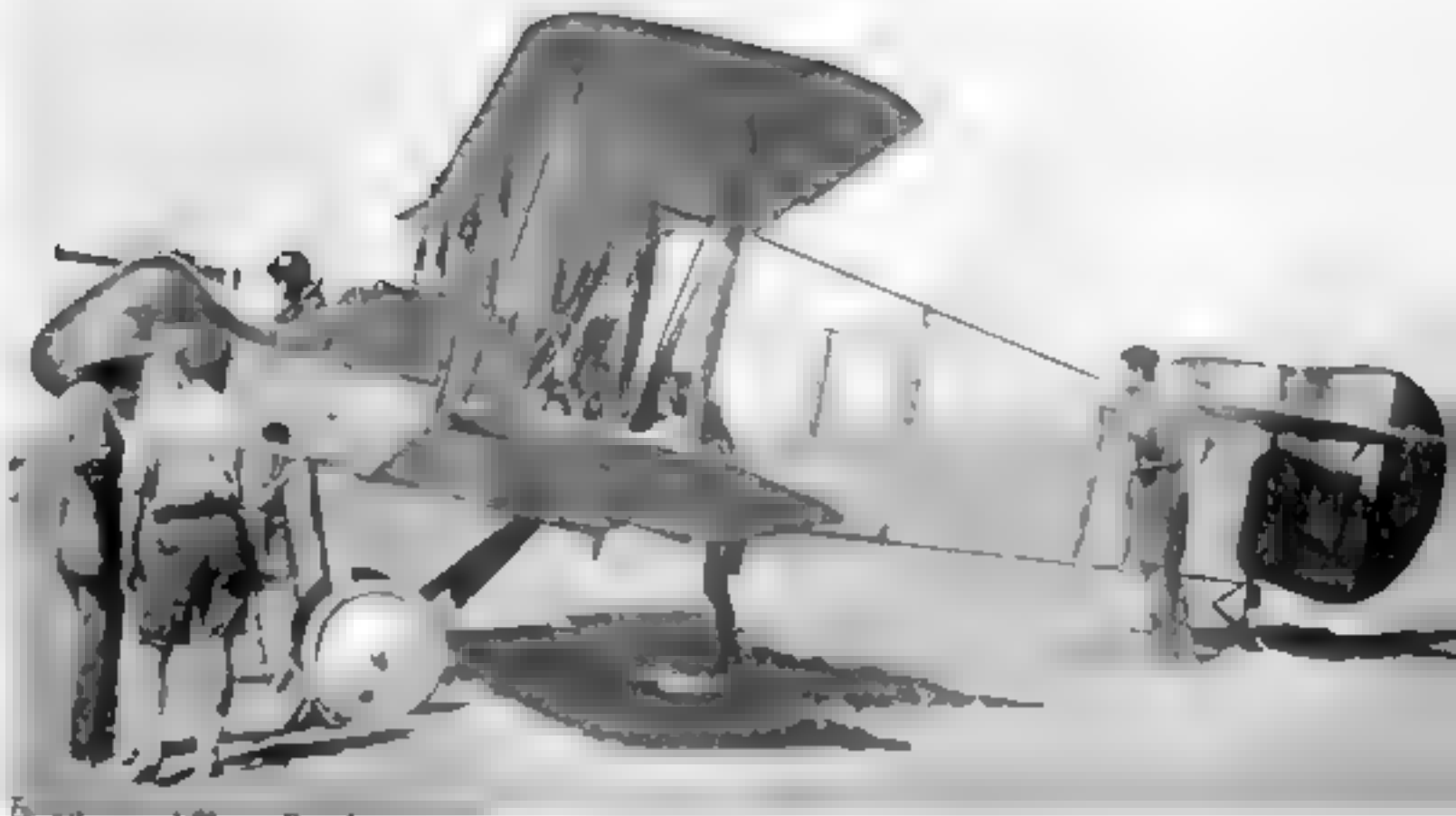
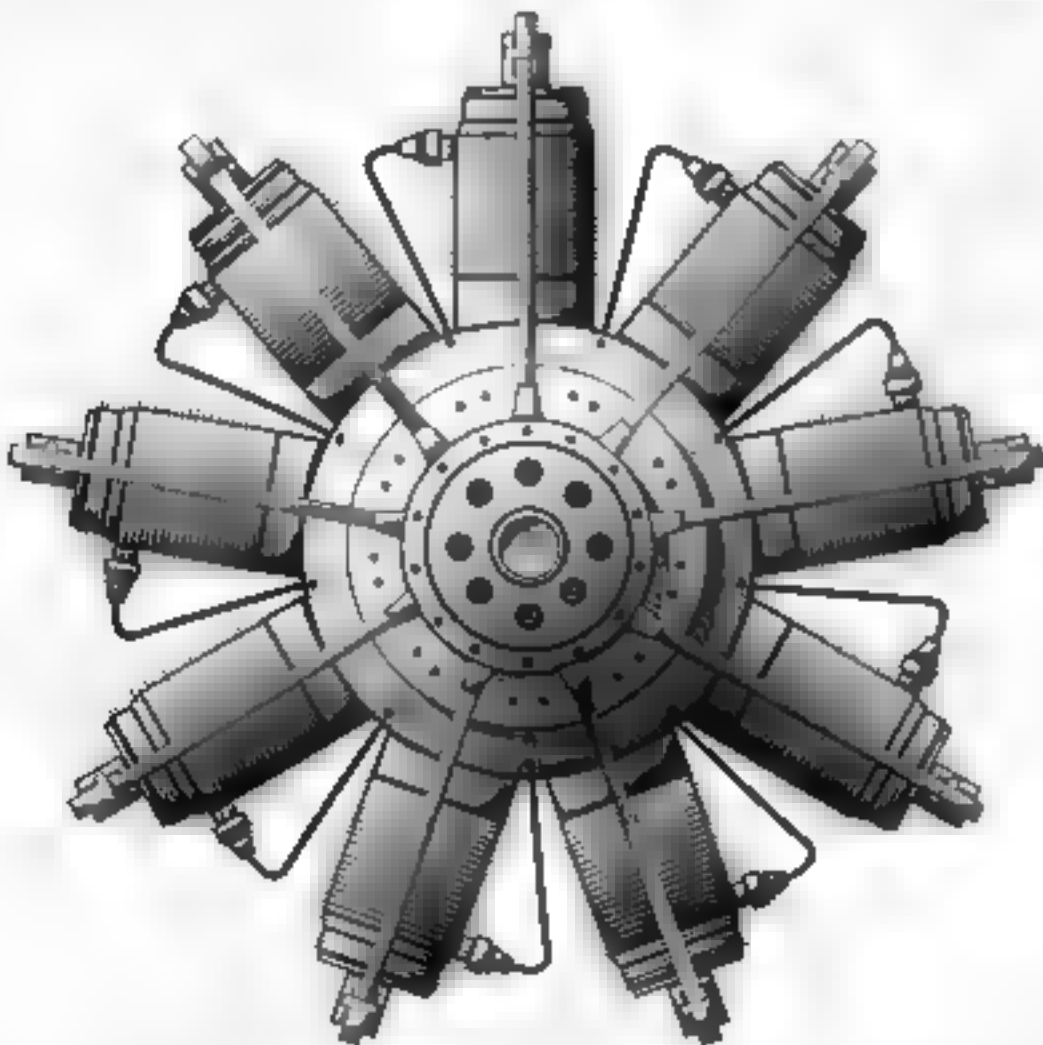
Hunched down in the cockpit and bundled against the cold, Lieutenant A. M. Wilkinson of No. 24 Squadron prepares for take off on a frosty morning. The ammunition bin, compass fairing, gun mounting, and pilot tube are all similar to that of Lieutenant Andrews' machine on the previous page. The gravity fuel tank is located beneath the upper port wing on both Wilkinson's and Andrews' DH 2s. The groundcrew will hold the machine steady during engine run up and then pull the wheel chocks when the pilot is ready to roll out.





This late production DH. 2 of No. 24 Squadron carries an Aldis gun sight behind the windscreen. The aircraft also features a fairing under the Lewis gun, an enlarged compass fairing, a centerline 5.75 gallon (21.8 Liter) gravity fuel tank mounted above the wing center section, and an aileron balance cable. This aircraft was flown by Captain H.W. von Poellnitz of the squadron's 'A' Flight.

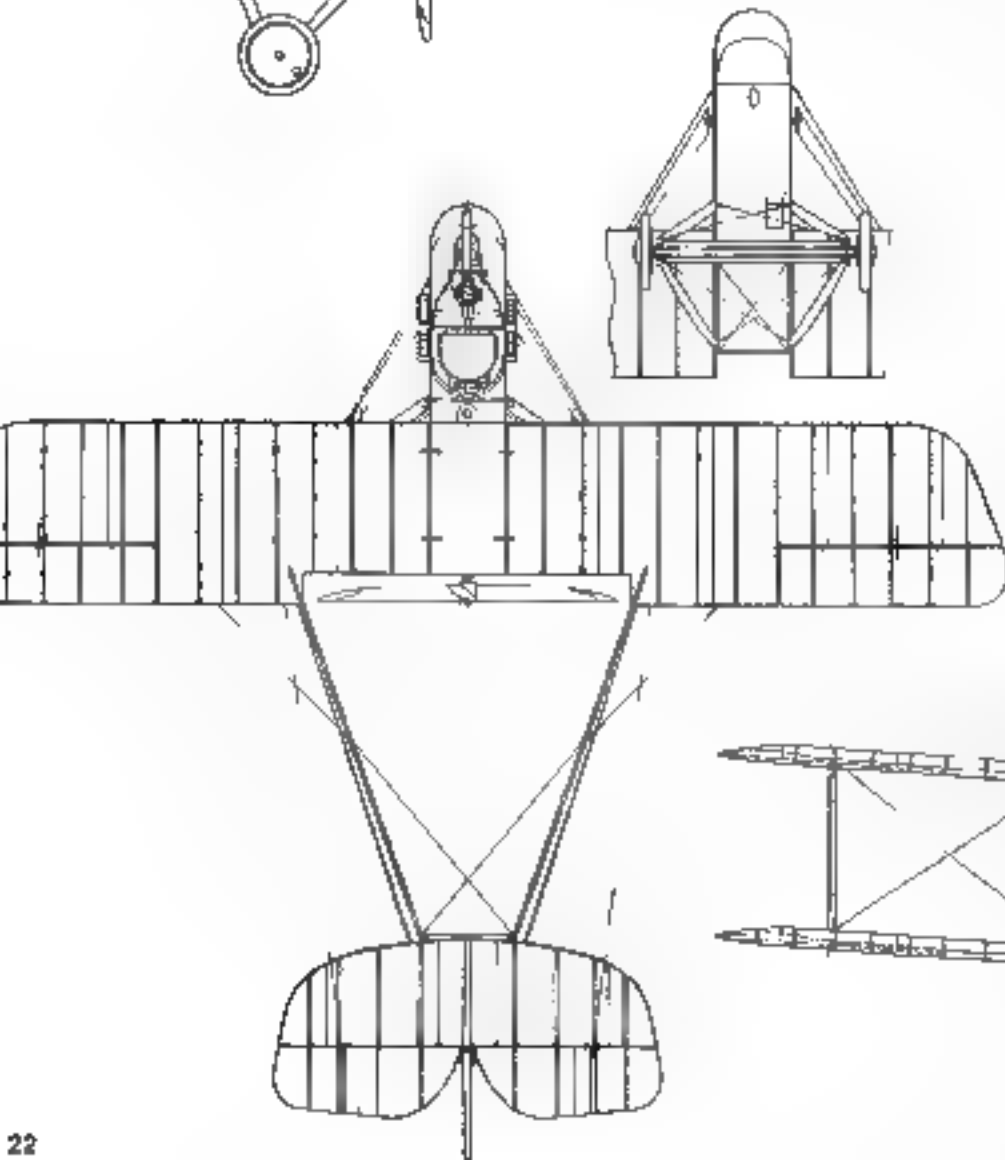
Gnome Monosoupape Rotary Engine



This DH.2 was assigned to No. 14 Squadron in Palestine for operations against the Turks. This DH.2 wore an overall clear dope finish on the fabric surfaces and medium gray paint on the metal areas. Like the earlier DH.1A, the DH.2 remained a viable combat aircraft in the Middle East well after its usefulness on the Western Front had declined.

A Royal Navy (RN) officer stands beside a DH.2, believed to be 8725, which the RN evaluated in 1916. The DH.2 was found unsuitable for RN service. This aircraft may have been redesignated A2562 for RN testing and equipped with a 90-hp Royal Aircraft Factory (RAF) engine. Brass fittings protect the tips of the propeller blades — a common fitting on four-bladed propellers.





Wingspan:.....28 Feet, 3 Inches (8.6 M)
Length25 Feet, 2 5 Inches (7.69 M)
Height: 9 Feet, 6.5 Inches (2.89 M)
Empty Weight: Monosoupape: 943 LBS (427.7 KG)
 Le Rhone: 1004 LBS (455.4 KG)
Max Weight:Monosoupape: 1441 lbs (653.6 kg)
 Le Rhone: 1547 lbs (701.7 kg)
Powerplant: ...One 100 HP Gnome monosoupape or
 one 110 HP Le Rhone 9T air-cooled
 rotary engine
Armament:.....One forward firing .303 caiber
 air-cooled Lewis machine gun
Speed Monosoupape: 93 MPH (149.7 KM/H)
 Le Rhone: 92 MPH (148.05 KM/H)
Endurance: .. Monosoupape: 2.75 hours
 Le Rhone: 3 hours
Crew:1





(Above) This early production DH.2 (5923) was retrofitted with a four-bladed propeller and a 110-hp Clerget engine. The aircraft is one of a batch of 100 produced by Airco. At least one additional DH.2 (serial number 5994) was also fitted with this powerplant, although there was little increase in performance. The tips of the four-bladed propeller were tipped with brass sheaths to prevent damage from debris thrown up by the propeller. Some four-bladed propellers used dope cotton bindings — most often appearing as a chordwise patch covering the entire leading and trailing edge of the tip.

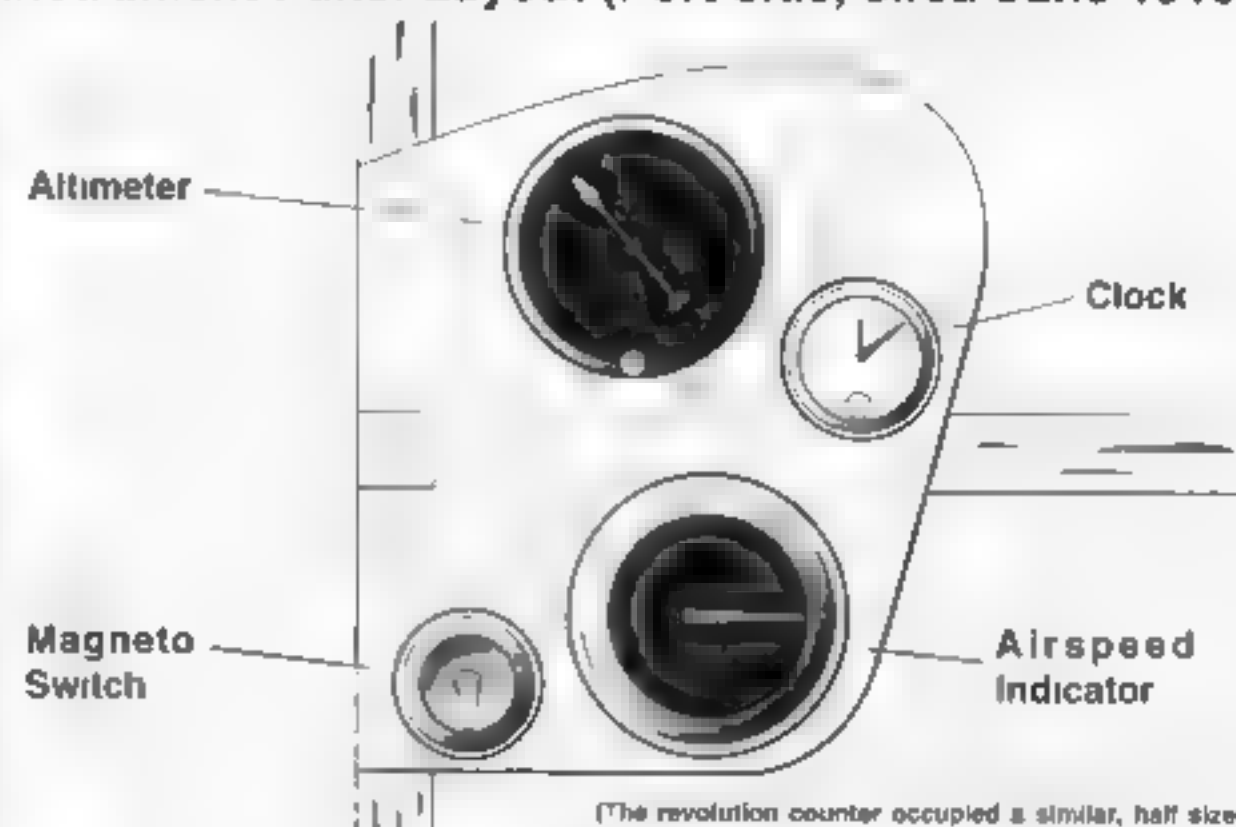


(Right) Le Prieur rockets were installed on 7862 — one of two DH.2s known to be so equipped. This aircraft was assigned to No. 32 Squadron and was flown by Lieutenant A. Cunningham. Lt Cunningham became an Air Marshal during World War Two. An asbestos sheet protects the lower wing fabric from the rockets' blast. Le Prieur rockets were used with some effectiveness against highly flammable German observation balloons. The rockets were also used on Nieuport fighters.



(Above) This DH 2 wears an upper surface camouflage of overall PC 10 khaki green. The national insignia on the nacelle has an unusual white border. This aircraft is believed to be employed for training duties in late 1916. By this time, the DH 2 was growing increasingly obsolete against the new Albatros fighters of the Imperial German Air Service.

Instrument Panel Layout (Port side, circa June 1916)



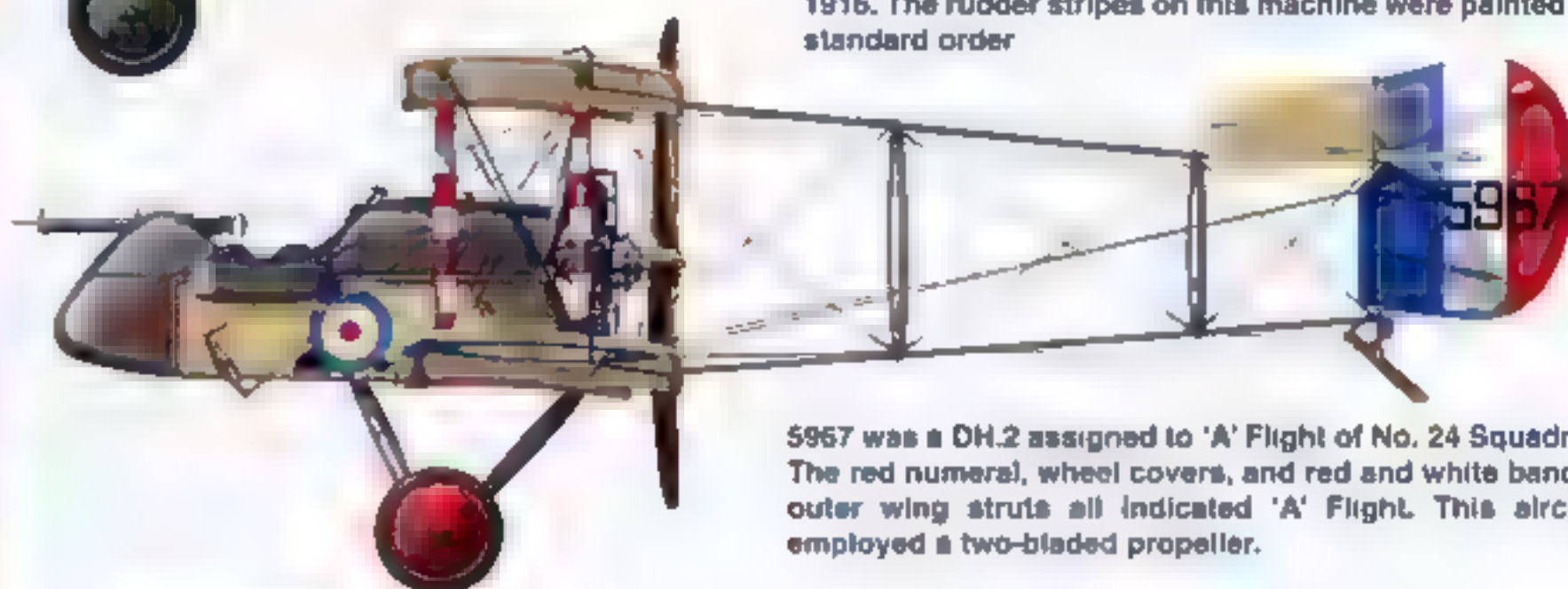
(The revolution counter occupied a similar, half sized panel on the starboard side with an air-pressure gauge on the adjacent longeron.)

(Below) No. 32 Squadron officers pose in front of one of their aircraft at Beauval in July of 1916. The standard DH.2 camouflage scheme was PC 10 khaki-green upper surfaces and clear cellulose dope under surfaces. A small rectangular windshield is placed above the centrally mounted Lewis machine gun.





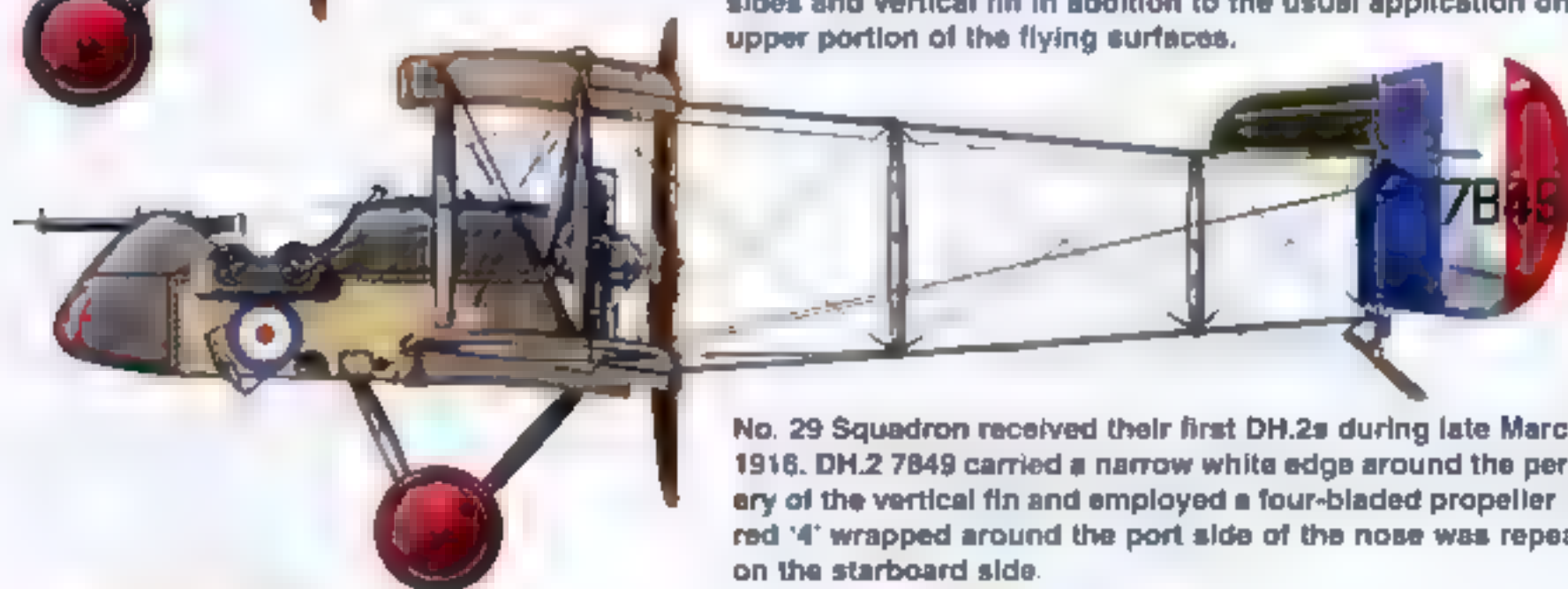
The DH.2 enjoyed considerable success against the Fokker E III monoplanes operated by the Imperial German Air Service. This DH.2 was based at the 4th Army Air Park at Beauval, France in 1916. The rudder stripes on this machine were painted in a non-standard order



5957 was a DH.2 assigned to 'A' Flight of No. 24 Squadron, RFC. The red numeral, wheel covers, and red and white bands on the outer wing struts all indicated 'A' Flight. This aircraft also employed a two-bladed propeller.



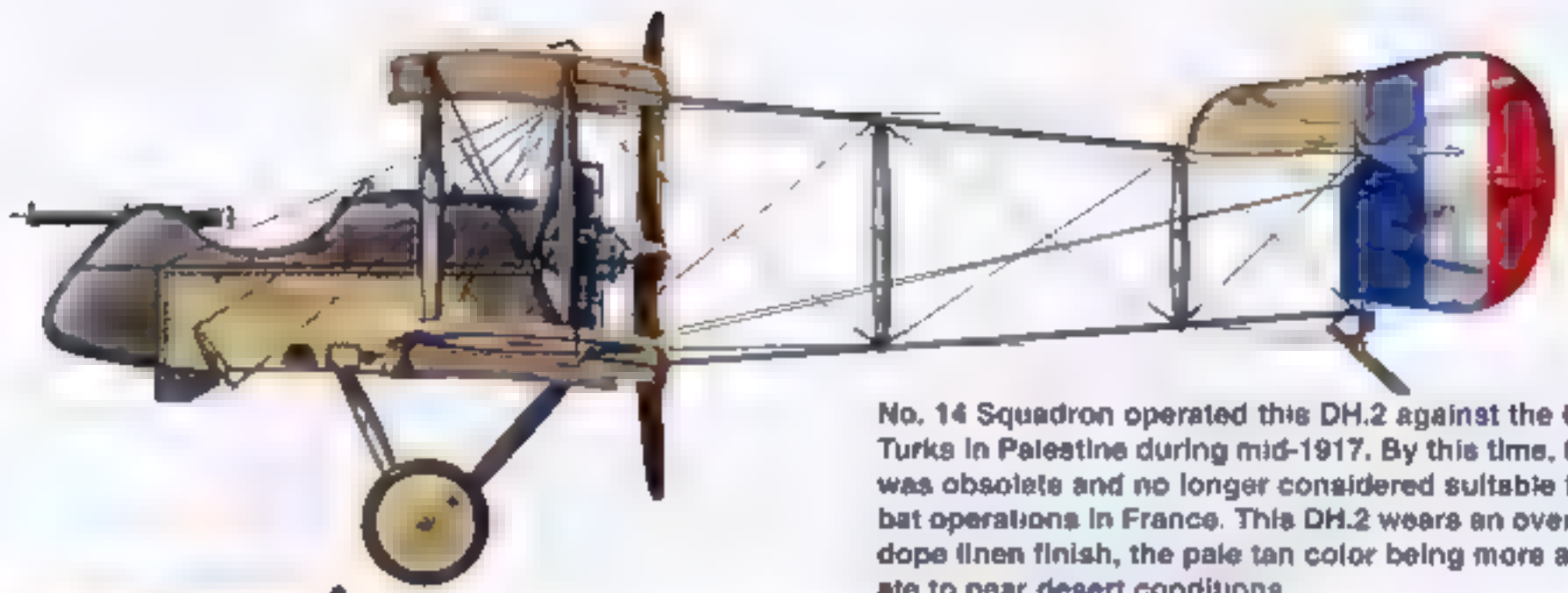
DH.2 6011 was also operated by No. 24 Squadron during mid-1916. This fighter has had PC 10 dope applied to the fuselage sides and vertical fin in addition to the usual application on the upper portion of the flying surfaces.



No. 29 Squadron received their first DH.2s during late March of 1916. DH.2 7849 carried a narrow white edge around the periphery of the vertical fin and employed a four-bladed propeller. The red '4' wrapped around the port side of the nose was repeated on the starboard side.



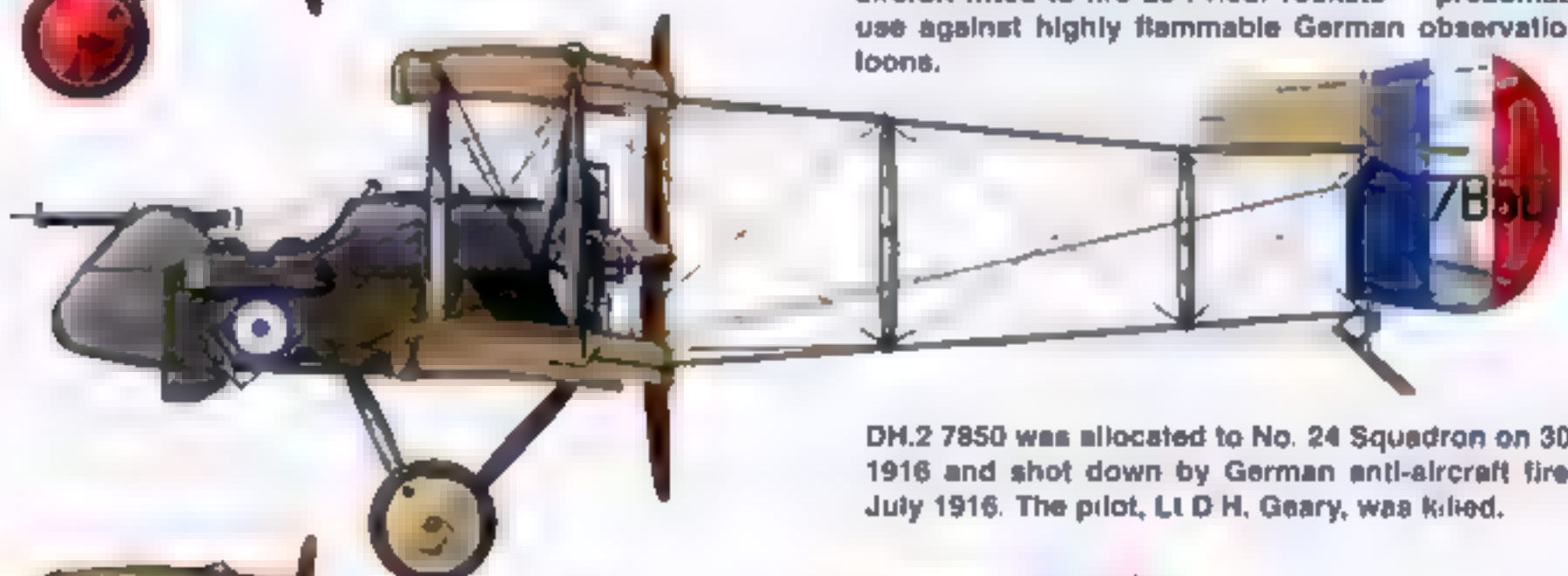
5994 was operated by No. 29 Squadron and flown in an entirely clear doped linen finish. The entire rudder was bordered with a thin white edging. Metal panels on the fuselage nacelle were finished in the standard medium grey.



No. 14 Squadron operated this DH.2 against the Ottoman Turks in Palestine during mid-1917. By this time, the DH.2 was obsolete and no longer considered suitable for combat operations in France. This DH.2 wears an overall clear dope linen finish, the pale tan color being more appropriate to near desert conditions.



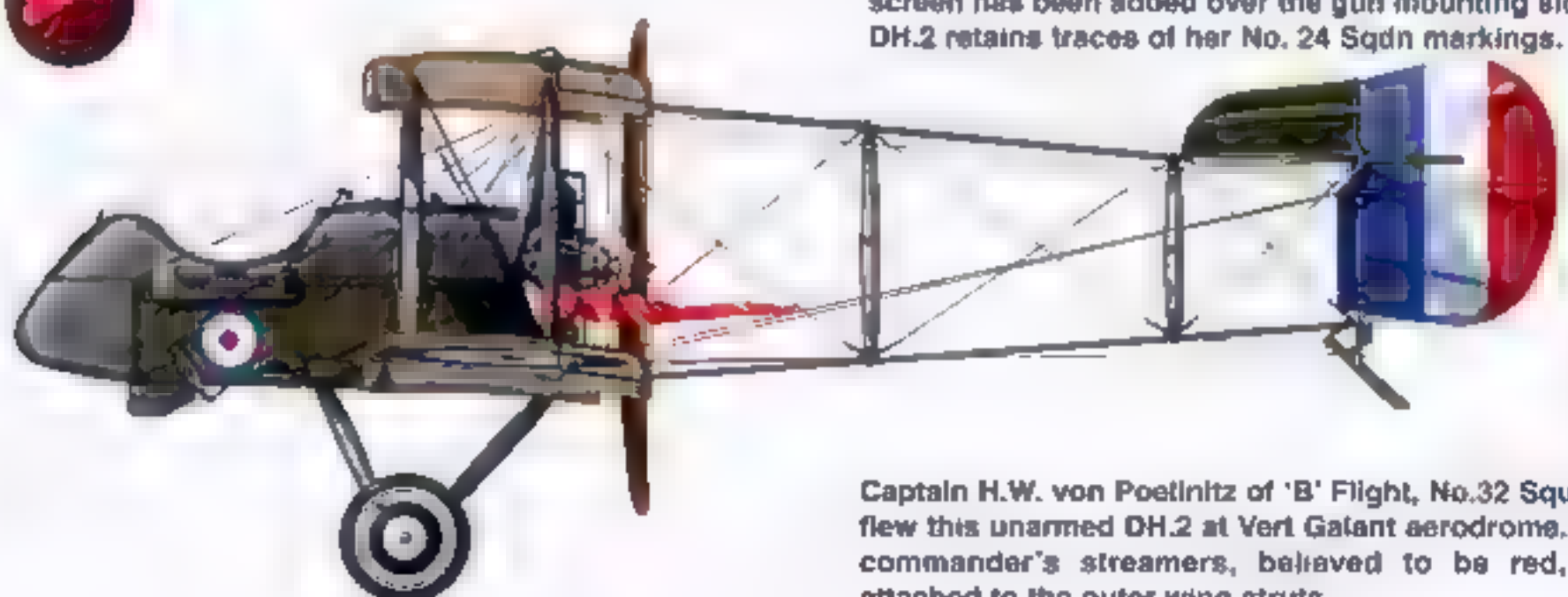
7852 was flown by Lt A. Cunningham while assigned to No.32 Squadron in France. This fighter was one of two aircraft fitted to fire Le Prieur rockets — presumably for use against highly flammable German observation balloons.



DH.2 7850 was allocated to No. 24 Squadron on 30 June 1916 and shot down by German anti-aircraft fire on 3 July 1916. The pilot, Lt D H. Geary, was killed.



DH.2 5925 served in No. 24 Squadron from February of 1916 to May of 1917 when it was returned to England for use as a trainer at Brooklands. A semi-circular wind-screen has been added over the gun mounting slot. The DH.2 retains traces of her No. 24 Sqn markings.



Captain H.W. von Poelnitz of 'B' Flight, No.32 Squadron flew this unarmed DH.2 at Vert Galant aerodrome. Flight commander's streamers, believed to be red, were attached to the outer wing struts.



(Above) Four DH 2s line up at the Fourth Army Aircraft Park at Beauval in 1916 — each displaying some subtle differences. The near aircraft's rudder is striped (front to rear) white, blue, and red. Additionally, the tips of the four-bladed propeller are protected with doped cotton bindings. The third aircraft is the only one displaying a serial number (believed to be 5983), while the fourth DH 2 lacks the gravity tank on the upper wing surface. Maj A.T.E. Cairnes, the commander of No. 32 Squadron, stands at the right.

Propeller Tips



(Right) This DH 2 (believed to be A2533) crash-landed into a shell crater near Martinpuisch just after 0930 hrs on 1 October 1916. The aircraft was assigned to A' Flight of No. 32 Squadron when it was shot down by two Rolands. The pilot, Capt H.W.G. Jones, escaped injury. Except for the caved-in nose cap and sheared landing gear, the DH 2 is structurally intact.



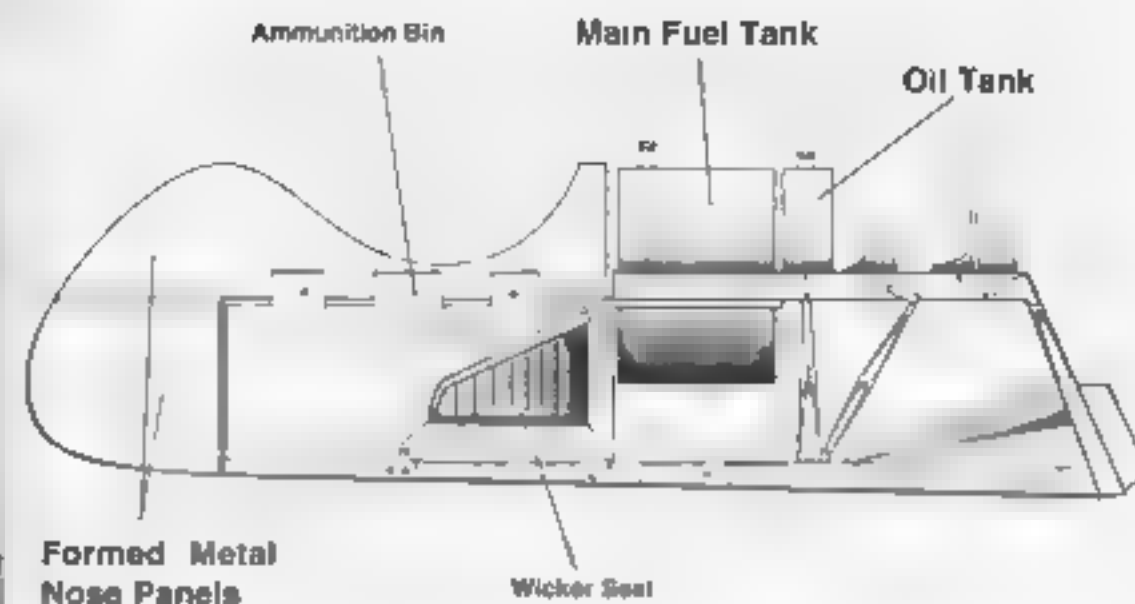


DH.2 (5938) was an early production aircraft which featured the early ammunition bin design and the gravity fuel tank mounted under the upper port wing. This DH.2 is also equipped with a two-bladed propeller. Later production machines, as well as many existing DH.2s were given four-bladed propellers in order to improve their performance.

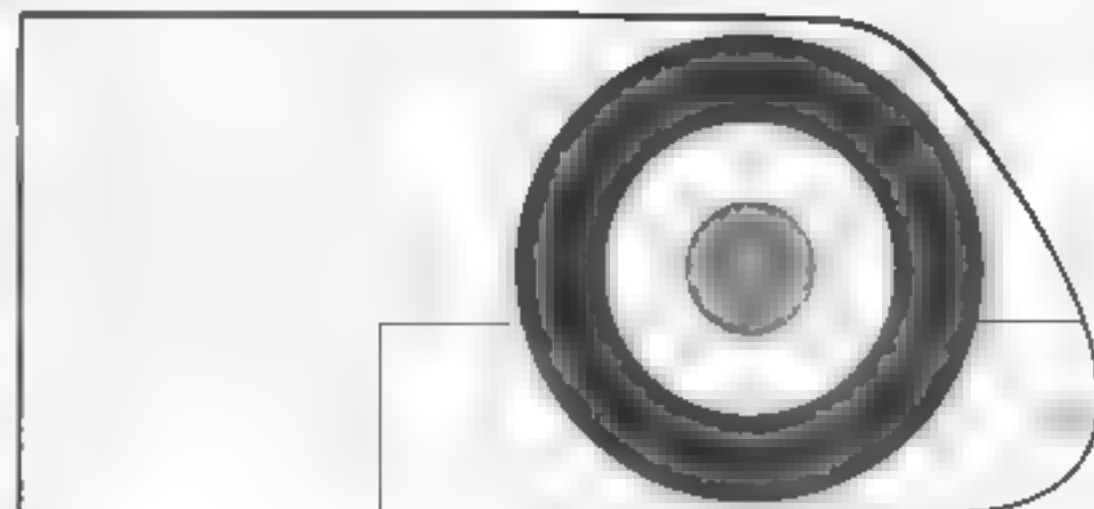
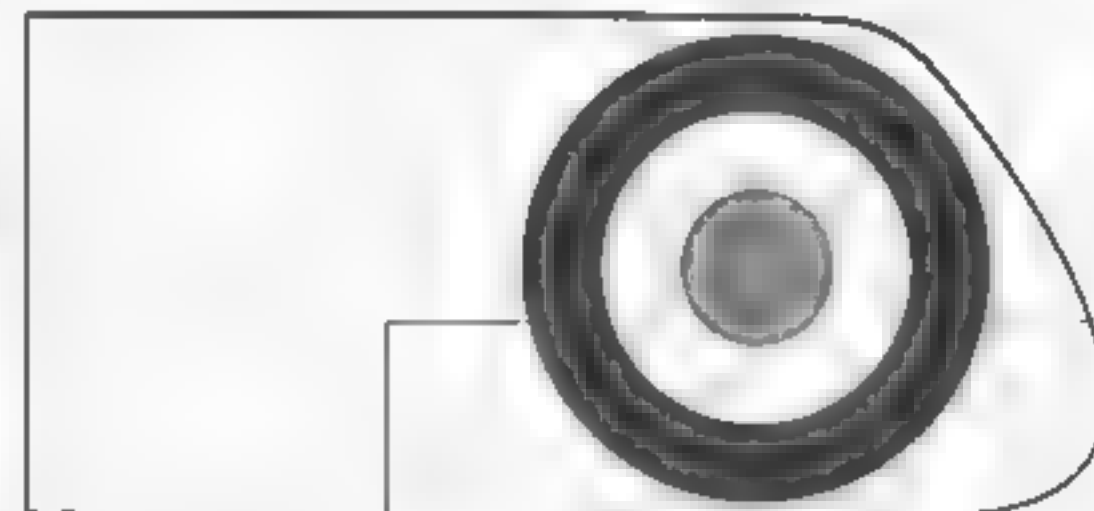
The fuel drain pipe led down from a fuel proofed cloth bag — surrounding the main 20.2 gallon (76.5 Liter) fuel tank — to the leading edge of the forward starboard landing gear strut. The bag was designed to catch leaks and prevent fuel fumes from building up inside the aft fuselage nacelle.



Fuselage Interior Structure



Wing Roundel Variations





A No. 14 Squadron pilot poses next to a DH.2 in the Middle East. The aircraft is finished in clear dope with metal surfaces painted medium grey. Clear dope, owing to its pale tan appearance, was a more suitable camouflage color in the Middle East. This is an early production DH.2 equipped with a gravity fuel tank mounted above the wing and a two-bladed propeller.

This aircraft is believed to have been assigned to No. 14 Squadron, Royal Flying Corps in Palestine and is camouflaged in overall clear cellulose dope. The upper wing roundel is barely discernible through the fabric on the upper wing. A gravity fuel tank is mounted above the port wing. The aft fuselage nacelle fabric is stained with engine oil.



This DH.2 (6001) was part of an order for 100 machines from AMC (Airco). The company's emblem is carried at the mid-point of all struts. Many DH.2 struts were left in varnished natural wood finish, however, most aircraft had the struts painted medium grey. The steel tail booms were usually painted medium grey as well.

Aircraft A5067 was among the last DH.2s built. The vertical stabilizer was believed to be finished in PC10 khaki-green. The fuselage nacelle is in grey and clear dope, while the barely visible British roundel is red (center), white, and blue. The color of the upper wing surfaces is unknown, but is likely to be PC10. Another DH.2 (A5084) from this same production batch was sent to the USA for evaluation.





A DH.2 (7850), parked at No. 2 Aircraft Depot at Candas, demonstrates the small size of the aircraft's cockpit —about two feet wide. Bungee cords were fitted to provide aileron return, although these were later changed to coil springs. The dorsal fairing contains the filler caps for the 20.2-gallon (76.5 Liters) main fuel tank (forward) and the 4.5-gallon (17 Liters) oil tank (aft). Late production machines had the fuel capacity increased to 26 gallons (98.4 L).



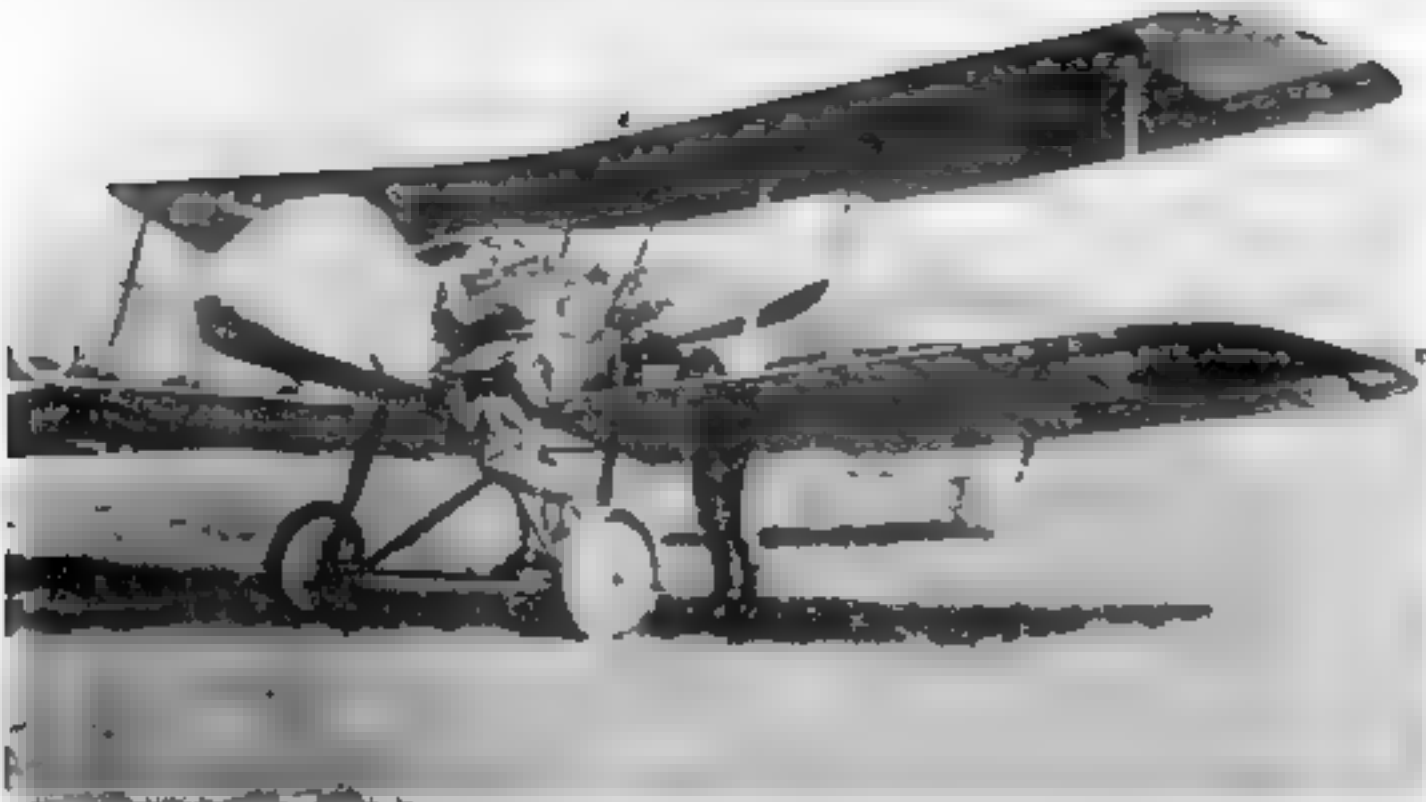
This late production DH 2 (7850) mounted a four-bladed propeller and an oversized compass fairing. The aircraft is finished in PC10, however the vertical stabilizer has a clear dope finish. Part numbers are placed on the rudder and fin, with AMC emblems on the struts. The darkened natural wood ammunition bin under the cockpit displays the wood grain — a common feature on PC10 finished aircraft. This machine was assigned to No. 24 Squadron when it was shot down by anti-aircraft fire on 30 June 1916. The DH.2's pilot, Lt D.H. Geary, was killed.



(Above) This early production DH.2 (5943) displays the two-bladed propeller and early pitot head common to this stage of production. The aircraft also carries the early model ammunition bin next to the cockpit, which had plain surfaces compared to later models of this bin. The gravity fuel tank is mounted beneath the upper wing surface.

(Below) This DH.2 (7851) was crated when it arrived in France in June of 1916. The fighter was issued to No. 32 Squadron's 'C' Flight on 2 September. The aircraft is marked 'C1' on the upper wing center section, with the characters straddling the gravity fuel tank. The wing surfaces were interchangeable — amply demonstrated by the faintly visible roundel carried on the upper surface of the lower port wing panel. This aircraft was lost on 7 January 1917 while flown by 2nd Lt E.G.S. Wagner.





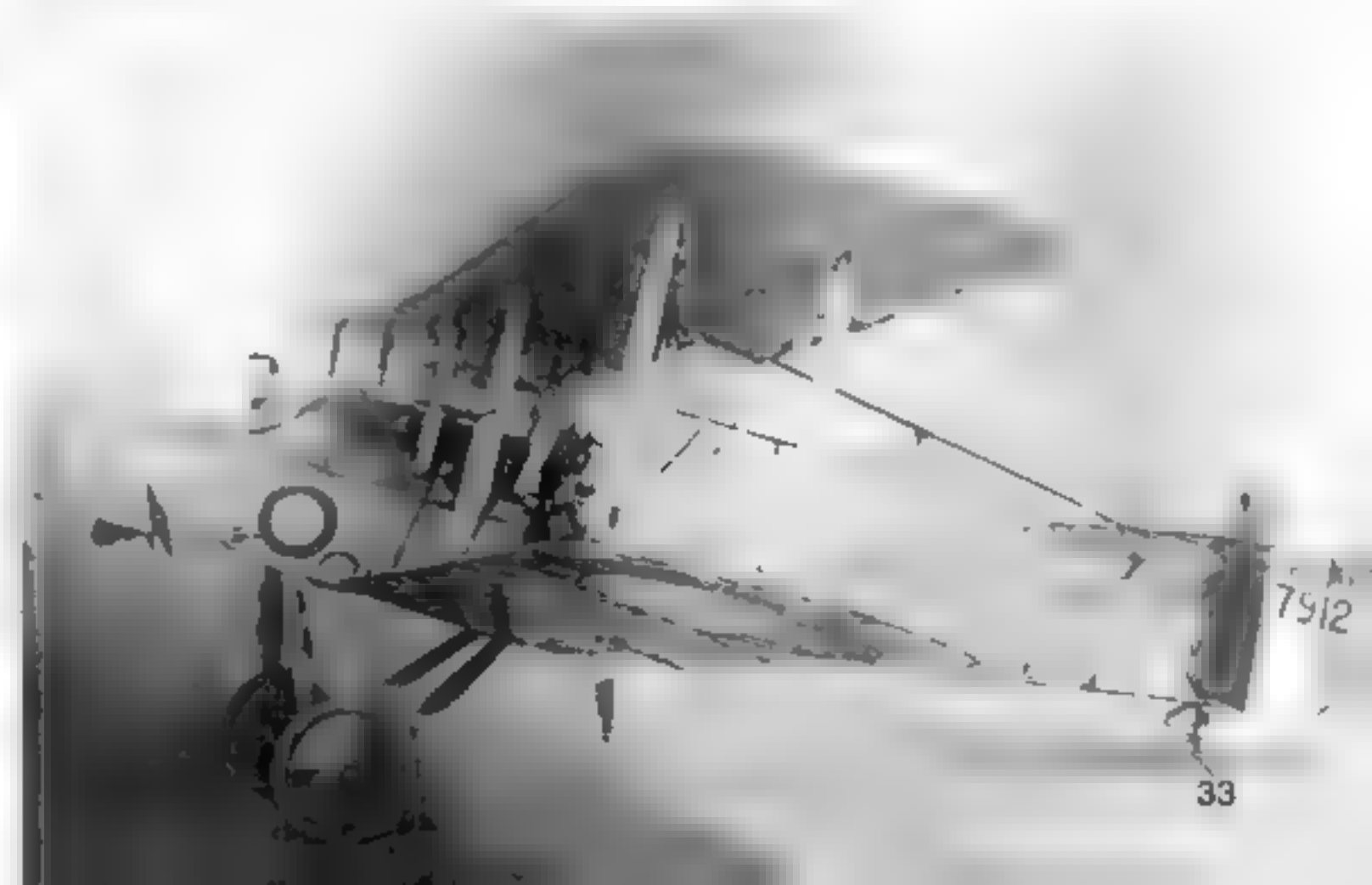
Getting aboard the DH.2 involved using the landing gear struts and tire as a ladder, gripping the cockpit rim with the hands, and putting the left foot into a foot well built into the side of the nacelle. Pilots usually wore heavy fleece lined leather coats and boots to protect them from the cold slipstream.

A mechanic perches on a stepladder while adjusting the .303 caliber (7.7 mm) Lewis machine gun of this DH.2. Other mechanics are stationed by the propeller and tail. In common with most WW I aircraft, the engine was started by swinging the propeller. The DH.2, in common with most WW I aircraft, lacked brakes, requiring wheel chocks and ground-crews to hold it in place until the pilot was ready for takeoff.



This DH.2 was assigned to No. 14 Reserve Squadron at Catterick during the spring of 1917. By this time, the DH.2 was slowly disappearing from front line units. The last DH.2s were withdrawn from combat operations in France during the mid-summer of 1917. The fin is stained by castor oil thrown back from the engine in flight.

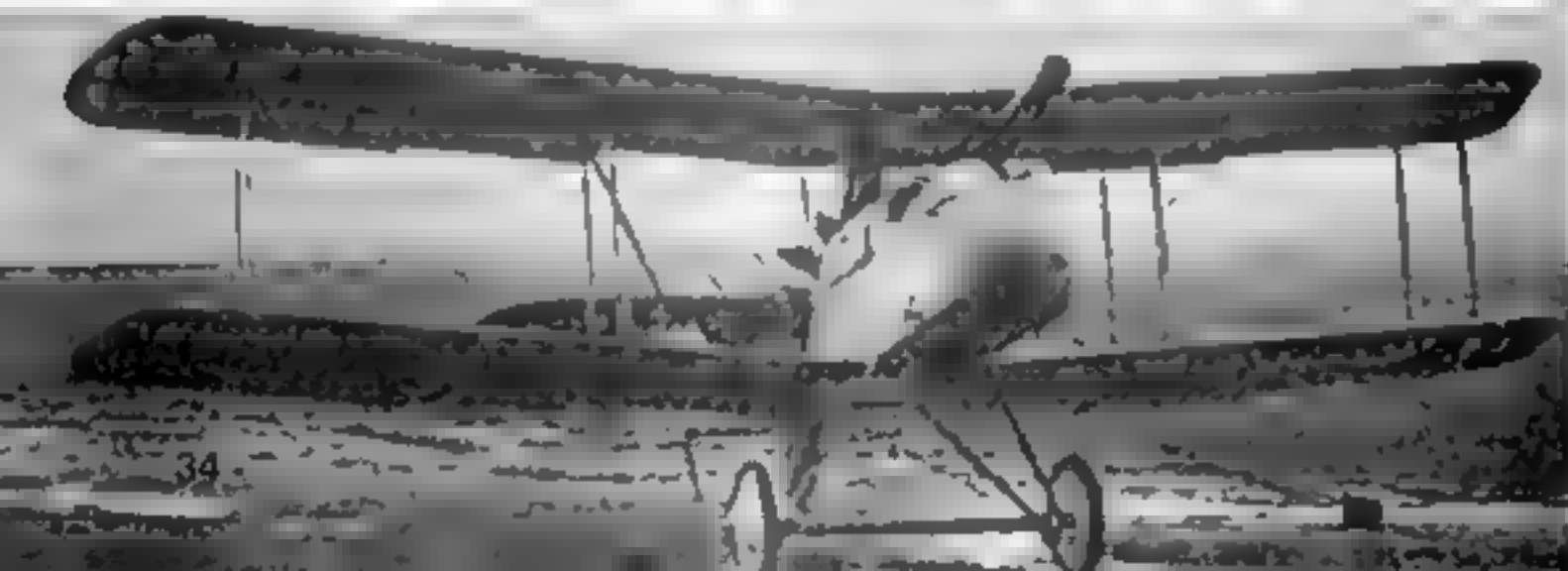
DH.2 (7912) was assigned to the Central Flying School at Netheravon. Although the aircraft has a clear dope finish, the nacelle roundel displays a nonstandard white border. This unarmed DH.2 also lacks the side ammunition bins and is equipped with the later style pitot tube.





Little is known about the device mounted in the nose of this DH.2 (believed to be 5918). This is thought to be a camera with a long focal length lens. This lens enabled the aircraft to perform oblique reconnaissance missions from the comparative safety of friendly air space. An Aldis sight is mounted on top of this camera

This DH.2, believed to be 5918, mounts a long-range camera in the nose. A cap has been placed over the lens to prevent damage. Photographs of this aircraft were used in a British aircraft recognition manual



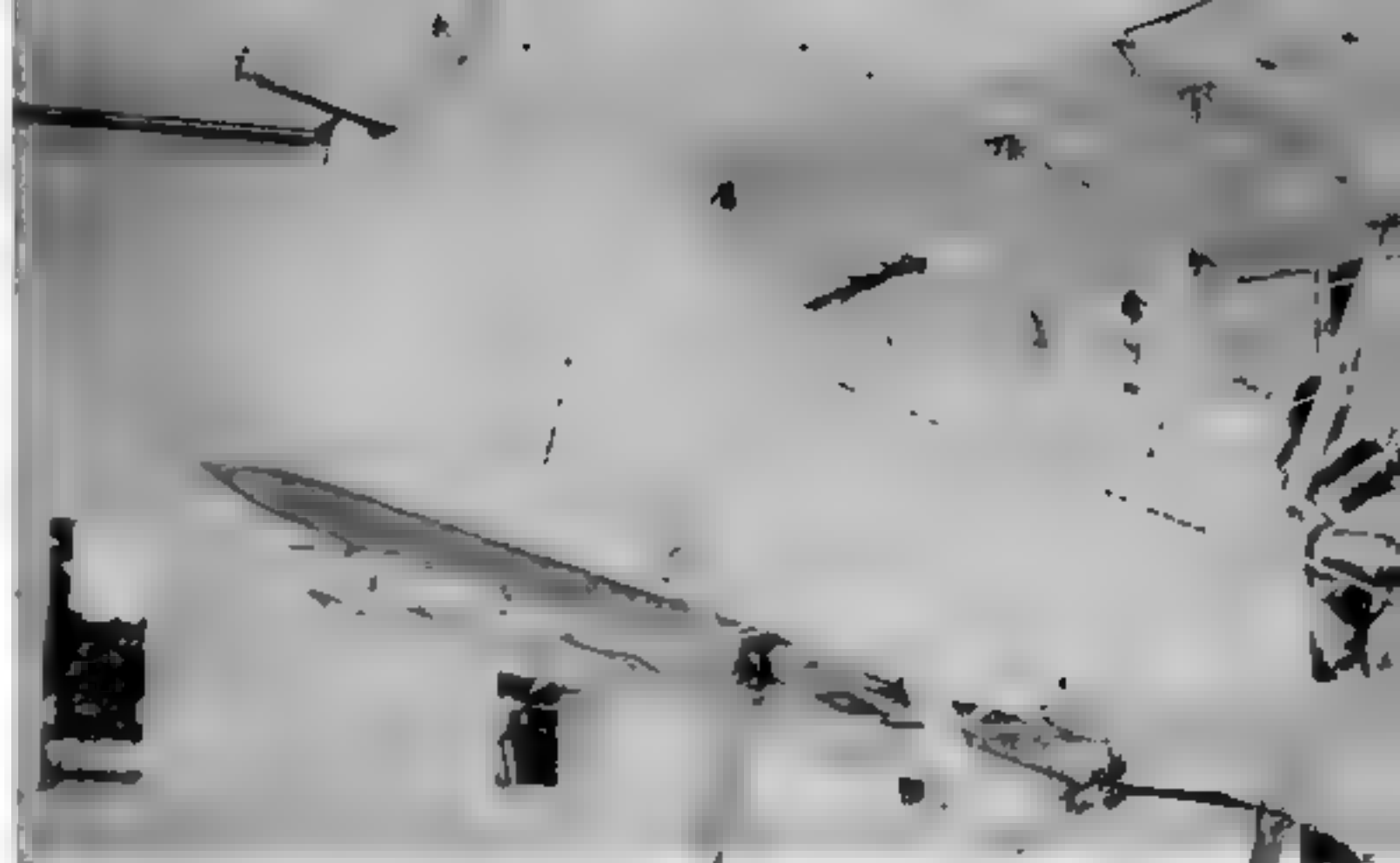
What is believed to be a prototype of the Hythe Camera Gun Mk I is mounted on the nose of this DH.2 (A2582). The camera gun was used to provide intelligence data. The serial number was painted on the nacelle side of some DH.2s. This aircraft was flown by Geoffrey Hilton Bowman, DSO, MC, DFC while at a training establishment in the UK.

This low-flying and unarmed DH.2 carries its serial number on the nacelle rather than the standard rudder position. This machine is thought to have been assigned to a training establishment.



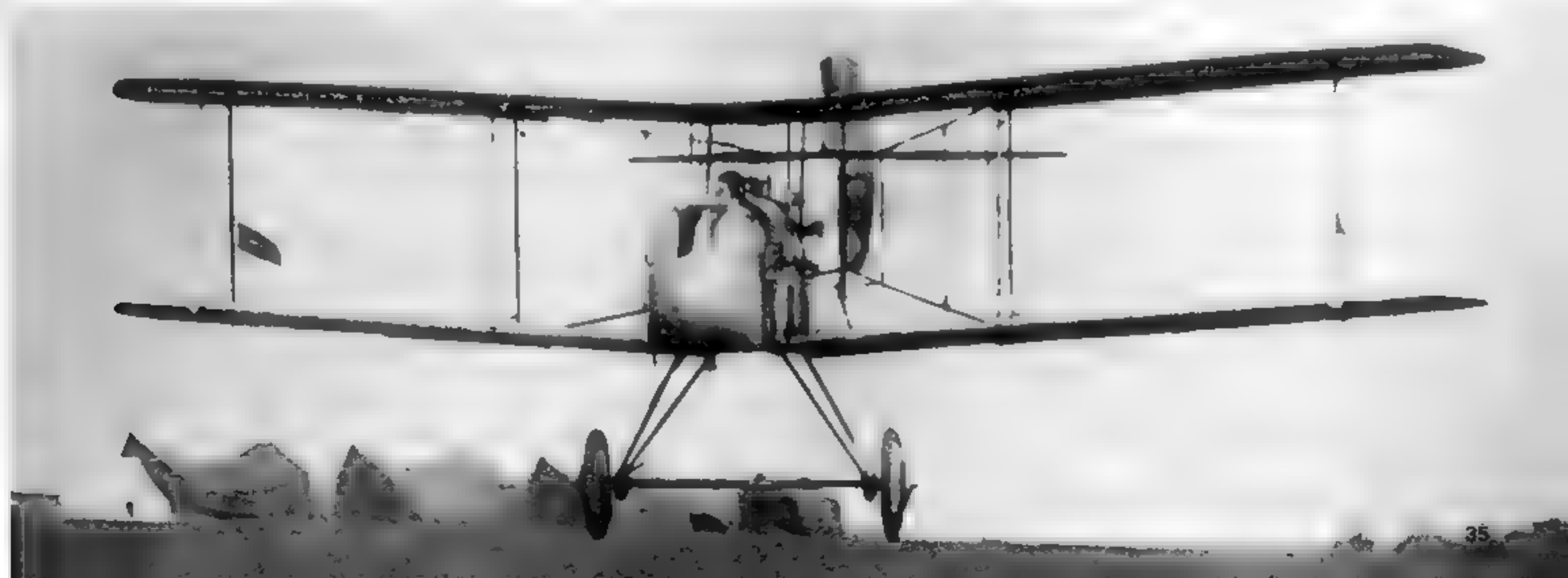


(Above) This DH.2 is believed to be assigned to a training unit. The blue number 3 on the nose has a white outline. No armament is fitted to this aircraft. The fuel tank cover aft of the cockpit has been removed to expose the oversized linen bag covering the tank. This bag collected dripping fuel and vented it out of the nacelle via a small tube. The bag had no armor or self-sealing capability.



(Above) This aircraft is fitted with an unusual rectangular gun bracket made from sheet metal. Additionally, this DH.2 has an open inspection panel on the nacelle under surface in front of the forward wing spar. Apart from detail changes in the gun mount, ammunition storage bins, and cockpit instrumentation, the DH.2 cockpit nacelle changed little during its production run.

(Below) Capt H.W. von Poellnitz takes off from Vert Galant aerodrome in his DH.2. The aircraft is doped in PC10 khaki-green with metal parts painted medium grey. Flight Commander's streamers appear on the outer inter-plane struts, while the wheels carry the markings of 'B' Flight, No. 32 Squadron — a black ring on a white wheel cover.



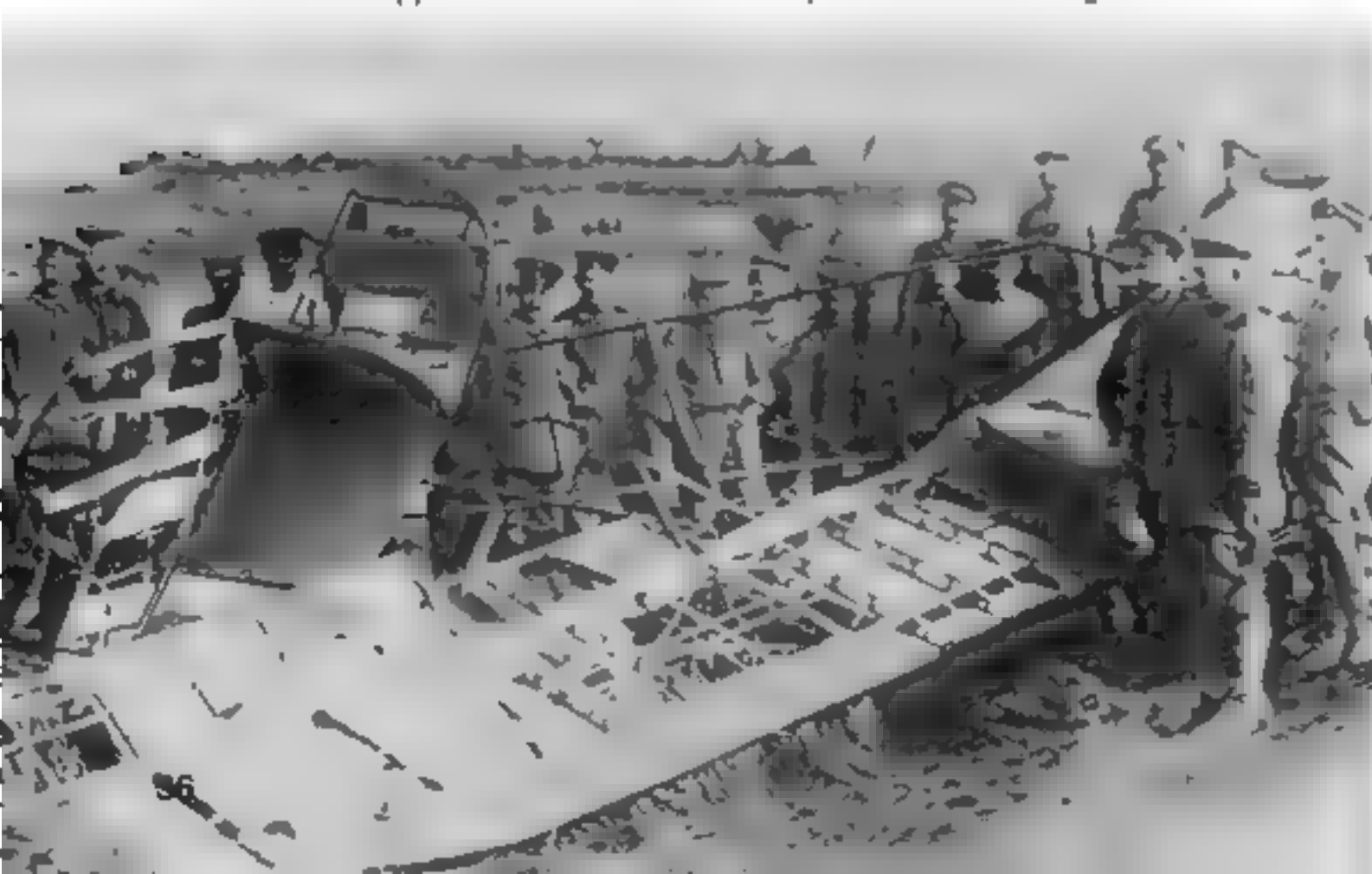


DH.2 (5954) was assigned to No. 32 Squadron before being transferred to the Central Flying School. The individual leaning on the tail boom is in the hazardous position taken by ground crewmen for 'swinging the propeller'. For engine start, however, the cockpit would have to be occupied to turn on the engine ignition switch.



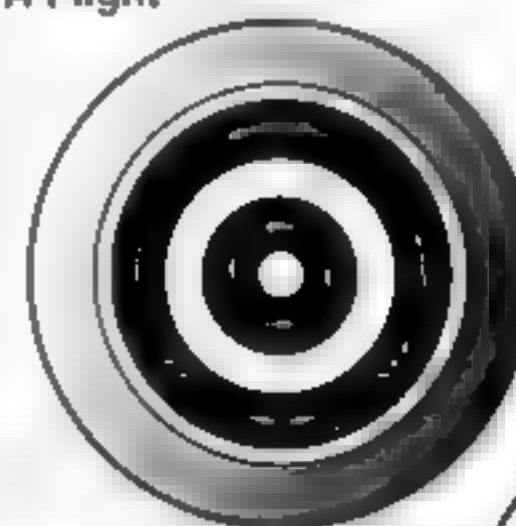
This DH.2 is prepared for delivery to an operational squadron. A gravity fuel tank is mounted beneath the upper wing center section. A Morane training aircraft is parked in the background. Groundcrew hold the wingtips and the crewman designated to swing the propeller has positioned himself between the tail booms.

German soldiers stand beside the twisted wreckage of 5947, a No. 29 Squadron DH.2 shot down on 26 November 1916. Roundels, rudder stripes, and other pieces of fabric have been cut away as souvenirs, exposing the machine's wing and tail structure. Part of the steel tail booms appear to have survived the impact without bending.

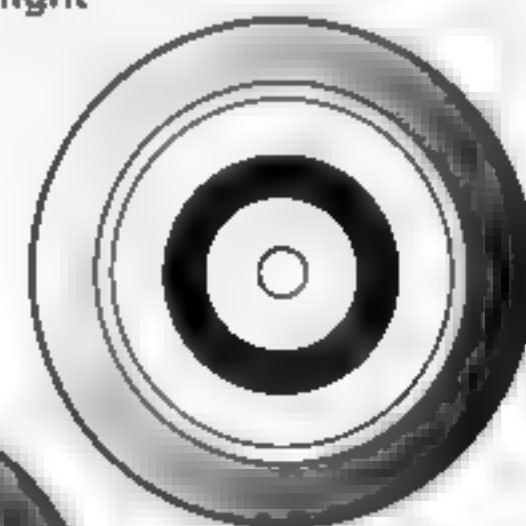


Black and White Wheel Markings, No 32 Squadron, August 1916 and Onward

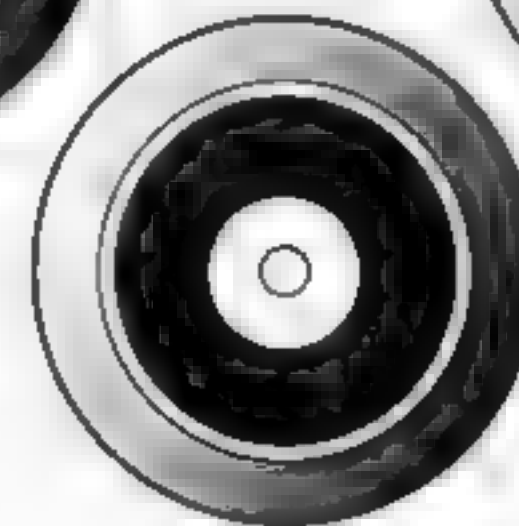
A Flight



B Flight



C Flight





DH.2 (7907) displays the black and white wheel markings of No. 32 Squadron's 'B' Flight. The aircraft is finished in clear dope, while the aluminum nacelle panels, steel tail booms, and wooden struts are painted medium grey. A four-blade propeller and late ammunition bins are fitted to this late production DH.2. The ammunition bins have cutouts to allow the pilot to slip his hand between the drum and carrying strap, pull the drum out of the bin, and attach it to the top of the Lewis gun.



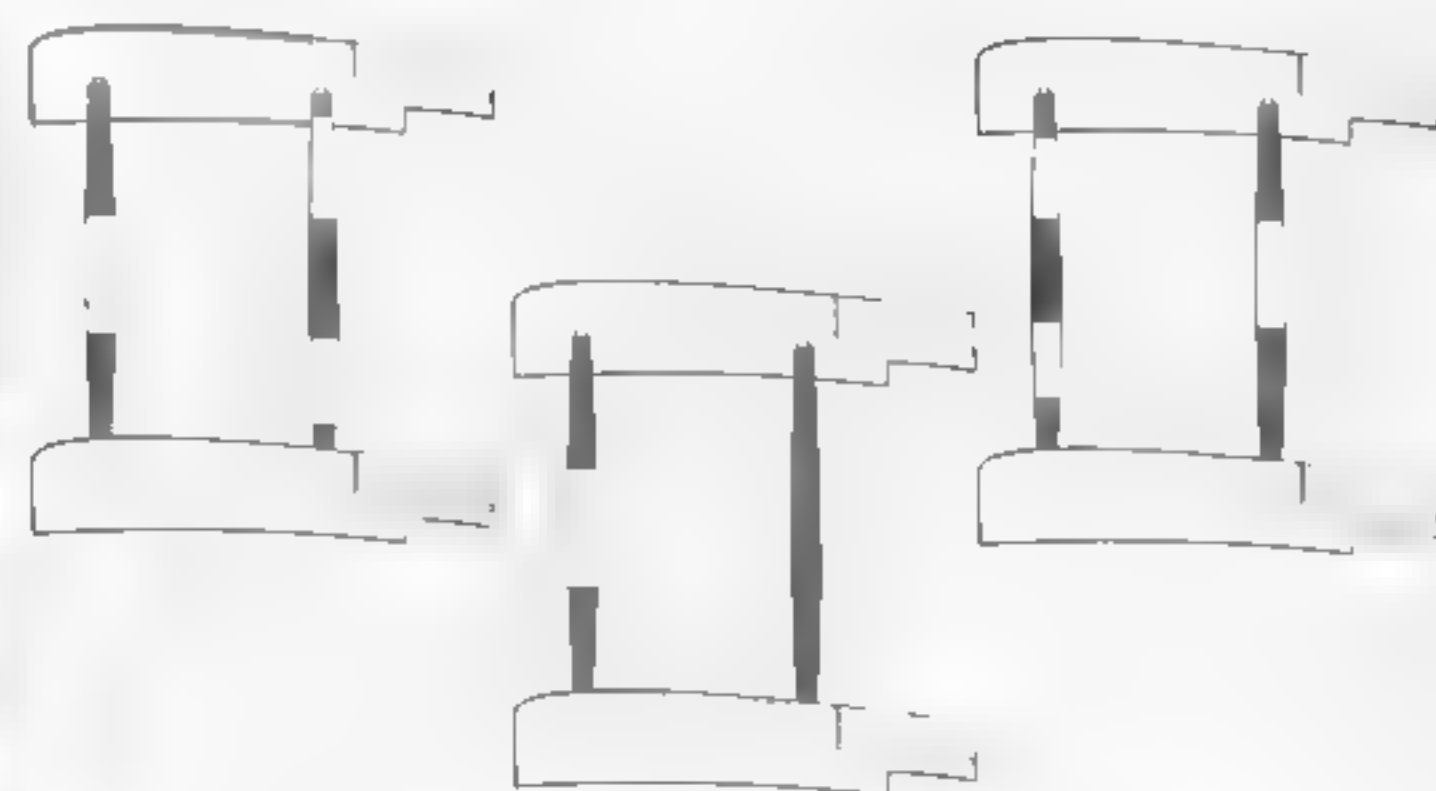
A ladder has been placed next to an early production DH.2's nacelle to allow access to the machine gun. An ammunition drum has been fitted to the gun. The six-inch wide lap-belt hangs over the starboard side of the cockpit. DH.2s, indeed most WW I fighters, did have shoulder harnesses.

This DH.2, believed to be 5973, lacks the roundel beneath the lower starboard wing, but carries a roundel beneath the upper starboard wing — another example of the interchangeability of the four outer wing panels. The nacelle and wheel discs are finished in PC10 khaki-green dope, while the wings and fin are in clear dope. Booms and struts are painted gray, with the latter displaying AMC logos at their midpoints.



This clear-doped, early production DH.2 (5944) was assigned to No. 24 Squadron, which deployed to St. Omer, France on 7 February 1916. Flight color bars have not yet been added to the wing struts. A ladder has been placed beside the port side of the nacelle for servicing this aircraft. This early production machine is equipped with a two-bladed propeller.

No 24 Squadron Outer Wing Strut Markings in Flight Color and White



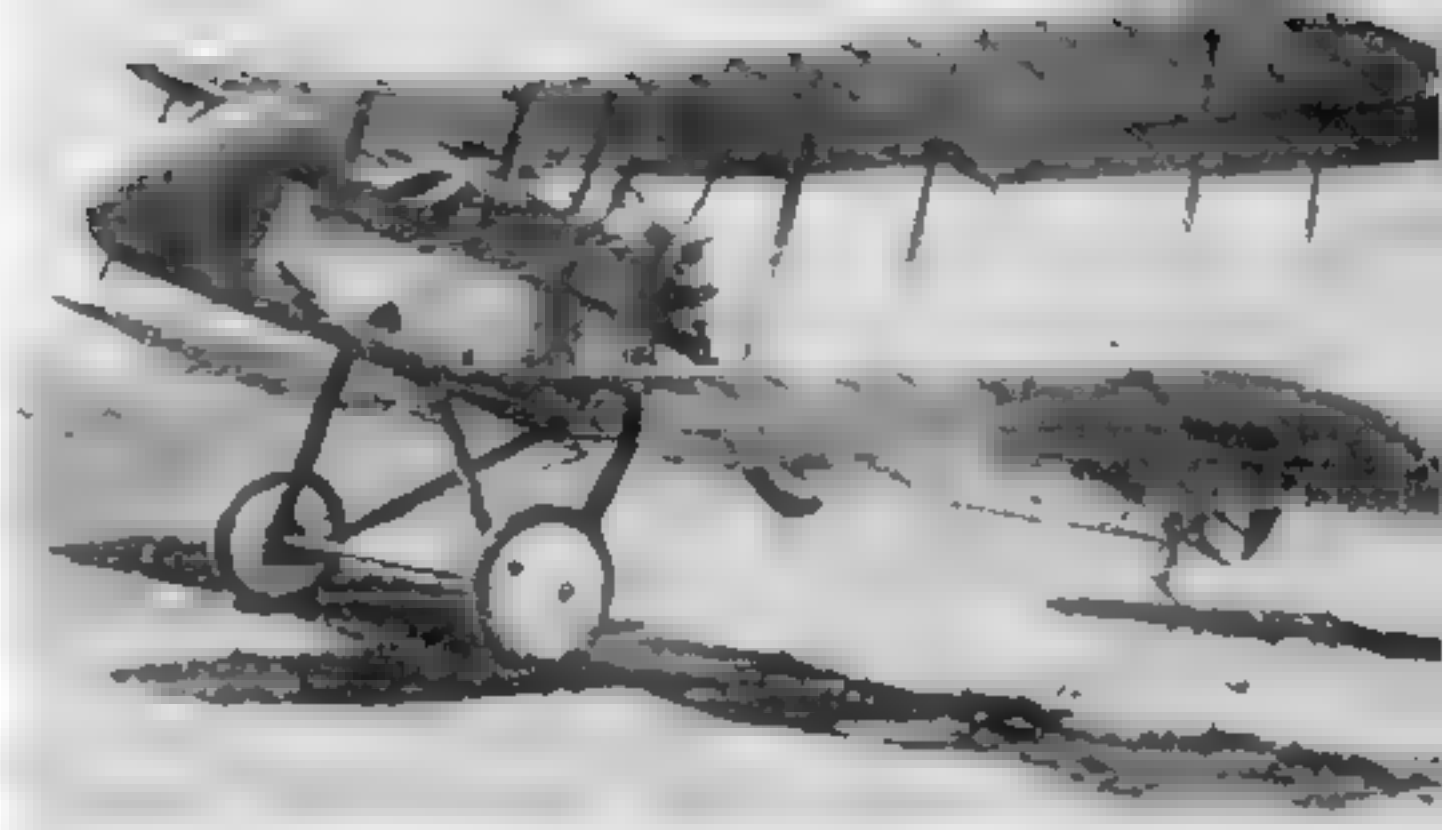


This DH.2 (5925) was assigned to 'A' Flight of No. 24 Squadron at Bertangles in July of 1916. This machine carries a rectangular windshield above the machine gun and forward of the cockpit sill. The nacelle forward fabric is wrinkled, while the roundel is smaller than usual for this period. Wheel covers are painted red, and the outer struts are painted red and white. A Morane-Saulnier 'N' monoplane (A.178) is parked beside the DH.2.



DH.2 (6001) was destroyed in a crash at its home base of Netheravon on 27 May 1916. This early production aircraft is equipped with a two-bladed propeller and appears to lack both a machine gun and the side ammunition bins. The upper wing gravity fuel tank is offset to port.

This No. 24 Squadron DH.2 at Bertangles displays the AMC emblems on the wing struts. The blue outer ring of the national insignia has faded considerably due to a durability problem with this shade of dope at the time. The wheels are mounted with the conical side facing inward, a non-standard manner of installation, but a means of increasing the wheel track by some six inches (15.24 cm).



Another DH.2 based at Netheravon in 1916 is fitted with storage bins for the Lewis gun ammunition drums beside the port cockpit sill. The aircraft is doped in unpigmented (clear) cellulose dope with the metal areas painted grey.

This DH.2, also based at Bertangles, appears to have been doped PC10 khaki-green on the vertical stabilizer and possibly the wings' upper surfaces. The nose has been equipped with a Lewis gun and a rectangular windshield.

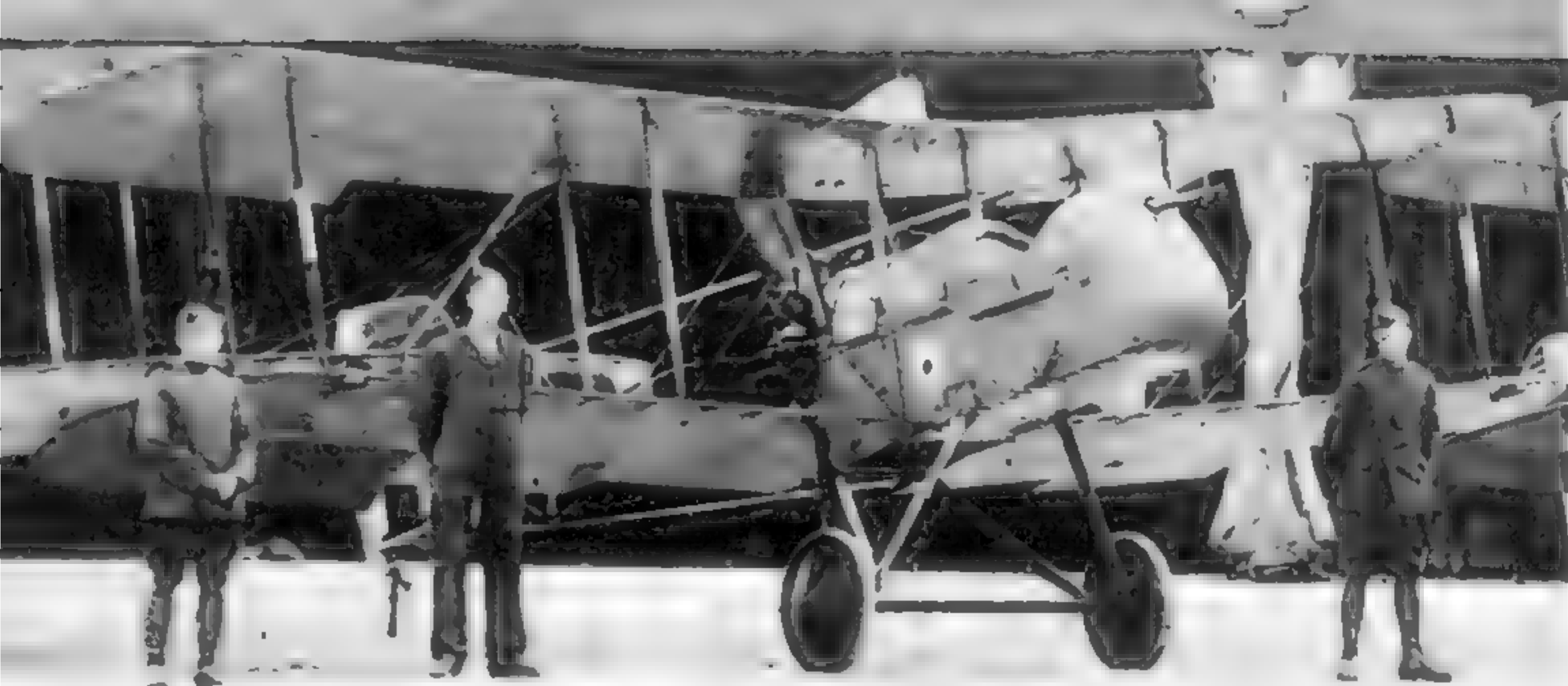




(Above) 2nd Lt Otto Lerwill stands in front of an unidentified DH.2. The machine gun is believed to be fitted to a 'semi-movable' mount, which is secured by a clip rather than fixed into position with a clamp. Most pilots preferred to fix the Lewis gun in place and aim the aircraft at the target rather than fly the aircraft and aim the weapon separately. The small compass fairing is mounted under the nacelle.



(Right) This DH.2 was assigned to No. 111 Squadron at Deir-et-Belah, Palestine in October of 1917. The aircraft has been fitted with a late model pilot tube on the strut and a four-bladed FE8-type Darracq propeller. Bessoneau canvas hangars are in the background.

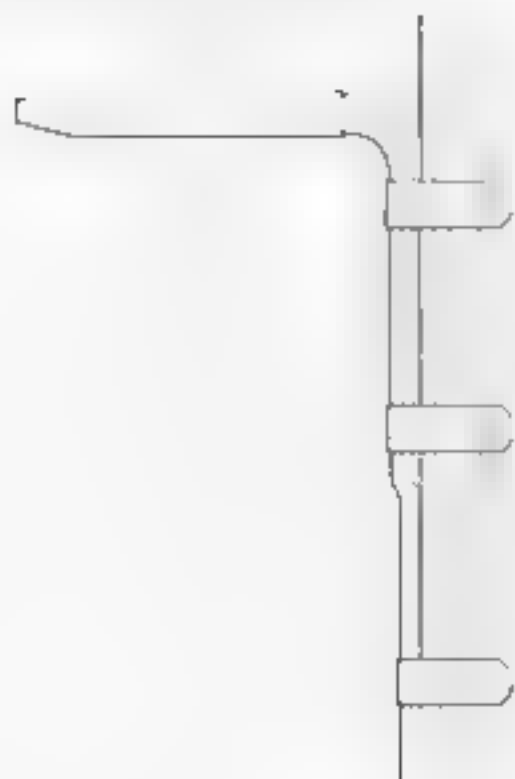


This No. 24 Squadron DH.2 based at Bertangles wears PC10 khaki-green dope on its upper surfaces as well as under the nacelle in the unit's distinctive saw-tooth marking. Red and

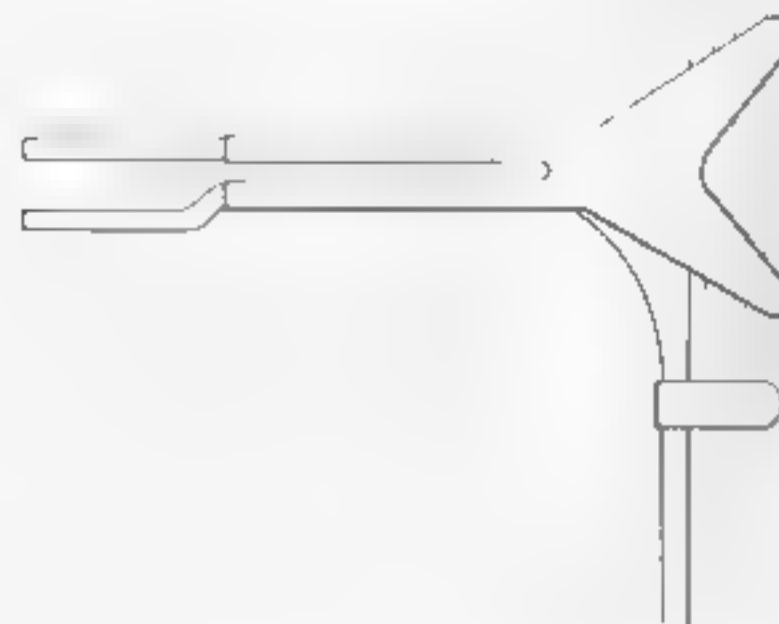
white bands are painted on the forward outer wing struts, while the wheels are painted red. The 'saw-tooth' effect under the nacelle was a feature of No. 24 Squadron.

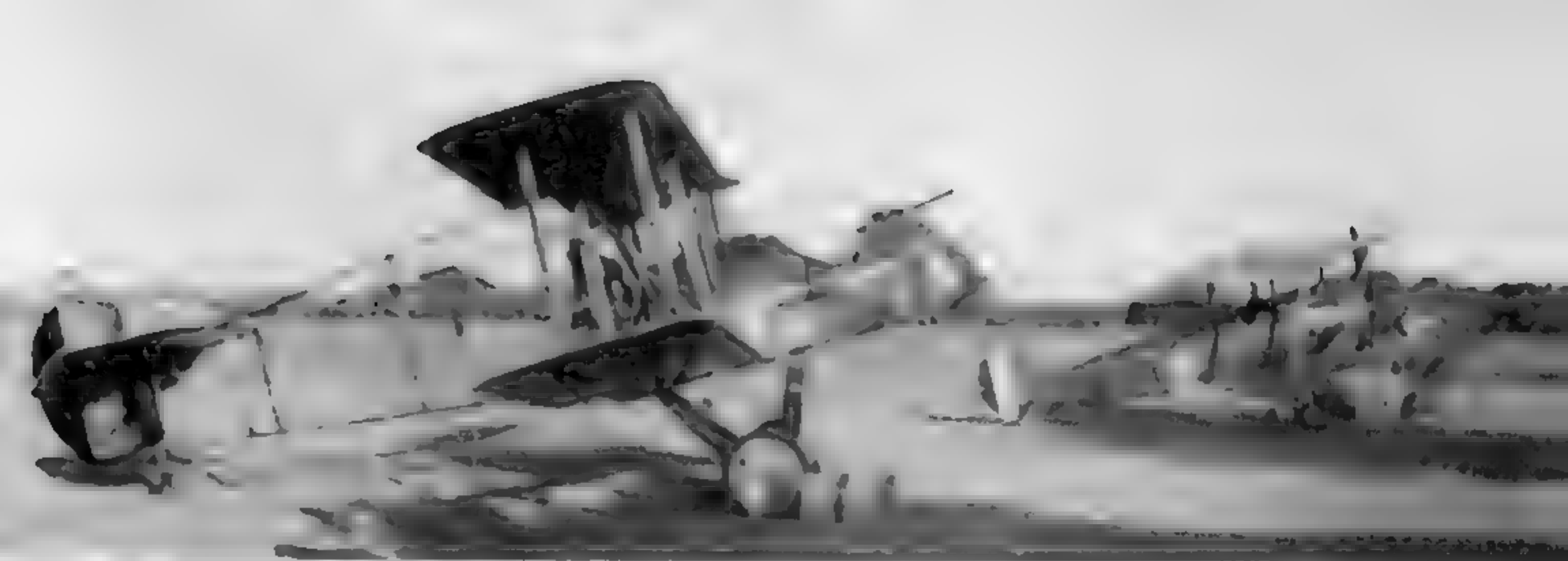
Pitot Tube Variations

Early



Late





(Below) This unarmed DH.2 (5925) is parked in front of the hangars at Brooklands. The main wing structure is visible due to the clear cellulose dope finish. Most WW I fighters lacked brakes, the wheel chocks prevented the aircraft from rolling on the ground until the engine was warmed up. The nacelle has the 'saw-tooth' marking of No. 24 Squadron

(Above) The machine gun of this DH.2 — assigned to No. 14 Squadron in Palestine — lacks the cylindrical cooling jacket usually found on Lewis guns mounted to these aircraft. The pilot's wide lap-strap hangs over the side of the cockpit. A Vickers F.B.19 Mk II is parked in the background.

(Below) The emblem of the Aircraft Manufacturing Company (Airco) appeared mainly on the wing and tail boom struts, however, it sometimes appeared on the undercarriage struts as well. The Airco logo consisted of gold and black lettering with the central letter 'A' and surrounding ring in copper.





This late production DH.2 (2582) is equipped with a four-bladed propeller with brass-sheathed tips. The gravity fuel tank on this aircraft is on top of the upper wing offset to port. Early production DH.2s had this tank placed under the top wing. The wheel discs are doped in either PC10 khaki-green or red. The application of the aircraft serial number on the nacelle was unusual, but not unknown. This aircraft is believed to be based at a training establishment.



The last two digits of this late production DH.2's serial number cannot be made out against the red rudder stripe. The aircraft's fabric surfaces are covered in clear dope, while the metal areas of the nacelle are painted flat grey. The DH.2 remained in combat service in France until mid-1917 and in the Middle East until late 1917 and early 1918.



The Royal Aircraft Factory F.E.8 entered service in August of 1916 — six months after the DH.2. Although resembling its Airco rival in appearance, the F.E.8 — in fact, the concept of the pusher fighter — was technically obsolete when introduced into service. This F.E.8, the second prototype (7457), is equipped with a propeller spinner, which did not appear on production machines.

DH. 2 Replica

An airworthy reproduction of an early DH.2 was rolled out at Withybusch airfield, Haverfordwest in the county of Dyfed, South Wales, England on 27 June 1998. The replica was fabricated over a period of 79 days and 1000 hours by Walt and Della Prettyman in the United States. The owner of this new replica DH.2 was Maurice Kirk, a veterinarian from Barry, South Wales, England.

Although resembling a DH.2, the new machine does differ from the original in several details. Among them are a more sharply contoured nacelle nose which has its first spacer moved further forward and additional stringers which were not present in the original aircraft. Two different motors have also been fitted, each characterized by differently rotating propellers. Additionally, both motors have been placed well aft on a more substantial mounting — presumably to move the center of gravity further to the rear.

Out on the wingtips, aileron balance appears to be accomplished via an internal cable whereas the DH.2s of WW I vintage most commonly used external springs. Most notable was the initial addition of a large, fixed stabilizer between the tail booms and an increase in the rudder area which resulted in a sharper angle to the straightened upper rudder line.

The replica was first marked GBH 7 on the rudder, but this was eventually changed to 5964, the serial number of a genuine Airco-built machine. The new machine was also given the British civil registration G-BFVA before its first scheduled public flight later in 1998. The squadron markings resemble those of No. 24 Squadron, Royal Flying Corps during the Battle of the Somme.

This DH.2 replica (GBH7) appeared at an air show in the UK in May of 1987. The aircraft, registered G-BFVA, would later receive more authentic markings for a First World War DH.2.



The DH.2 replica (GBH7) featured a revised rudder shape, rudder trim tab, and an additional vertical stabilizer area between the tail booms. Authentic DH.2s did not have this additional stabilizer area, nor did their rudders include a trim tab. These changes were a concession to improve flight safety in the modern era.

The DH.2 replica carried the rudder serial 5964 later in its career. The additional vertical stabilizer area has been deleted, and a roundel has been added to the side of the nacelle.





The nacelle of the replica DH.2 (G-BFVA) is slightly longer than that of an authentic DH.2. This creative license was necessary due to the extended engine housing on the replica. This housing is located further aft than those of WW I era DH.2s. Since there are no surviving DH.2s, this flying replica is the only link to Geoffrey de Havilland's little pusher scout.

Cordite, castor oil, and the wind in the wires...

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1137 Bristol Fighter

FOKKER EINDECKER in action



1158 Fokker Eindecker

de Havilland D.H.9 in action



1164 de Havilland D.H.9

FOKKER D.VII in action



1166 Fokker D.VII



2Lt D.M. Tidmarsh, flying DH.2 5929, is hit by a German anti-aircraft shell while flying at 10,000 feet. The round failed to detonate and both Tidmarsh and his aircraft returned safely to base with only an entry and exit hole in the nose cap to show for the incident.

A late production DH.2 (7907) of 'B' Flight, No. 32 Squadron takes off from its aerodrome in France. DH.2 pilots were usually heavily bundled against the cold and wind as a result of the exposed, forward location of the pusher's cockpit.



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